Pit and Quarry

With which is consolidated CEMENT-MILL & QUARRY

Member Audit Bureau of Circulations

Read in Largest Number of Plants

Vol. XXI | February 25, 1931 | No. 11

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Vol. XXI CHICAGO, FEBRUARY 25, 1931 No. 11

Frank Ansorge Dies in Detroit Hospital

PROMINENT IN CEMENT FIELD

Frank F. Ansorge of Grand Rapids, Mich., for many years connected with the sales department of the Newaygo Portland Cement Co., passed away in Ford Hospital in Detroit on January 21, following an operation.

Frank Frederick Ansorge was born in Grand Rapids, April 19, 1881, and grew to manhood and received his schooling in that city. In 1909 he entered the employ of the Newaygo Portland Cement Co. as a salesman and was made sales manager in 1924, following the death of J. F. Lockley. In June of last year Mr. Ansorge was given charge of the Detroit territory.

Devoted to his home and family, whose welfare was his hobby, Mr. Ansorge still found time to lend a helping hand to fellow men in need of aid, and his rare good nature and kindness of heart had endeared him to many.

Beside the widow, Mr. Ansorge leaves two daughters, Jean and Fern, of Detroit; his aged mother, Mrs. Catherine Ansorge, of Grand Rapids; four brothers, Ernest and Joseph, of Grand Rapids, and William A. and Edward C., of Newaygo. Funeral services and interment were in Grand Rapids.

Dewey Portland Cement to Build River Terminal

The Dewey Portland Cement Co., Kansas City, Mo., is considering the construction of a new river terminal at Buffalo, Ia., including dock, conveying, loading and other equipment to cost about $150,000. It is expected that work will be started early in the summer.

Petoskey Again Appoints J. B. John as President

The Petoskey Portland Cement Co. directors, at their annual meeting at Grand Rapids, Mich., elected the following officers: President, J. B. John, Cleveland; vice-presidents, Homer Sly, Petoskey; J. C. Buckbee, Chicago, and Herman Magnus, Cincinnati; treasurer and general manager, John L. A. Galster; secretary, Emory Nyman, Petoskey.

The same men were elected to the same offices in the Petoskey Transportation Co., a subsidiary carrier concern. Both companies were reported in good financial condition.

Resumption of activity at the Petoskey plant is expected in April.

Plans New Gravel Plant Near Centreville, Mich.

Construction of a sand-and-gravel plant near Centreville, Mich., is to be started shortly by the Michigan Concrete Materials Co. of Detroit. A 60-acre deposit, averaging 34 ft. in thickness, was recently leased near the town and a pipe line 800 ft. long will be laid to Prairie River to supply water for washing. The new plant will employ about 40 men, it is reported. Centreville is located about 30 miles south of Kalamazoo and considerable road construction is to be done in that vicinity this year.

Erects Crushing Plant to Fill State Contract

The Louisiana Quarry Co. is installing an Allis-Chalmers crushed-stone plant at Winfield, La., to supply stone on a state contract of 1,000,000 tons for highway purposes, the material to be delivered within 18 months. The plant will have a capacity of 100,000 tons per month, operating a 20-hour shift daily. Power for the plant will be brought over a 2-mile high-tension line from Bastrop, La. An artificial lake is to impound water for washing purposes.

Connellsville-Bluestone Expands Crushing Plant

The Connellsville-Bluestone Co., Connellsville, Pa., will carry out an expansion and improvement program at its stone quarry at South Connellsville, including the installation of a new crusher and auxiliary equipment.

New Cement Plant to be Erected in Philippines

The Rizal Cement Co., Inc., with offices at Muelle del Banco Nacional, Manila, P. I., is reported to be accepting bids for the construction of a cement plant on the Philippine Islands. The plant is said to be designed for a capacity of 1,500 bbl. per day, employing a single rotary kiln.

Woman Completes Big Sand-and-Gravel Deal

SELLS HOLDINGS AT TACOMA

That all of the real estate and promotional activities are not controlled by men is proved by a large deal just completed by Miss Hannah Thompson of Steilacoom, Wash., according to the Tacoma, Wash., *News-Tribune*.

For several years her father, W. C. Thompson, and John S. Baker have owned and operated the Steilacoom Sand & Gravel Co. The plant was operated by Mr. Thompson and his son. The latter died last year. The father, now 72 years of age, found that the duties and responsibilities of management were becoming onerous. Something had to be done.

This is where Miss Thompson stepped into the picture. She acquired 38 lots in a new addition to the city and some parcels of acreage at county tax sales for a few hundred dollars. By direct purchase she acquired about 25 acres of land adjoining holdings of the corporation.

Miss Thompson's next move was to secure an option from her father and John S. Baker for $60,000 on the plant and real estate of the Steilacoom Sand & Gravel Co. Her holdings were merged with those covered by the option, and negotiations were opened with the Pioneer Sand & Gravel Co. for a purchase of the entire property.

The deal was consummated recently when the Pioneer Sand & Gravel Co. and the Heffernans of Seattle and Tacoma, the latter operating the State Sand & Gravel Co. plant near Steilacoom, paid $92,500 for the combined holdings of the Steilacoom Sand & Gravel Co. and Hannah Thompson. Miss Thompson's net profit on the transaction was close to $30,000, and Baker and Thompson received $30,000 each for their stock in the Steilacoom company, it is understood.

The operation of the Steilacoom Sand & Gravel Co. will be discontinued, the machinery sold and the buildings torn down. Mr. Thompson will retire from active business.

All of the real estate formerly owned by the Steilacoom Sand & Gravel Co. and Hannah Thompson has been deeded to the Nisqually Land Co., a holding corporation owned by the Heffernans and the Pioneer Sand & Gravel Co.

Installs New Plant; Output Is Increased

REFLECTS GROWTH OF N. Y. FIRM

In 1928 William F. Borrman and Francis L. Borrman started a small stone-crushing plant at the quarry owned by William F. Borrman about two miles north of Norwood, N. Y., with a daily capacity of about 200 tons of finished product. When their product was put on the market and tested it was found to be of an exceptionally high quality and the demand increased rapidly. Improvements were made and new machinery added to take care of the increased demand and, during the past year, the plant was run day and night to fill orders. The demand for this product increased so rapidly that plans were made to build a new plant with a daily output of 1,800 tons.

In August, 1930, Arthur T. Oliver and William B. Spellman of the Oliver and Spellman Co., Chateaugay, N. Y., were taken into the partnership and the new company was incorporated as Borrman Stone Products, Inc. A new plant of the most modern design was purchased and is being installed. When completed, it will have a daily output of 1,800 tons. The new plant will also be able to crush fine stone for which there is a growing demand. The new plant will be in operation for spring deliveries.

Grading has been completed for a railroad spur connecting with the Norwood and St. Lawrence Railroad and the rails will be laid as soon as the weather permits. The corporation has a fleet of fast Stewart motor trucks which are used for making local deliveries.

The new corporation will also handle cement and other materials used in road building and other contracting operations. The officers of the new corporation are: William F. Borrman, Norwood, president and manager; William B. Spellman, Chateaugay, vice-president; Arthur T. Oliver, Chateaugay, treasurer; Frank J. Wagner, Malone, secretary; and Francis L. Borrman, Norfolk, superintendent of plant.

Constructs New Office; to Lower Quarry Level

The Dolomite Products Co., Inc., of Rochester, N. Y., operator of two crushed-stone and one sand-and-gravel plants near that city, recently erected a new office building at its Gates plant. The new structure is of concrete block, coated with stucco and, with its tile roof, presents a very pleasing appearance. The walls and ceilings are lined with cork and the ceiling beams are of steel.

The main floor of the building is being used for general and private offices, the second floor for a meeting room and the basement for wash and store rooms. The building is built at the edge of a worked-out quarry face and has a concrete observation platform on the quarry side from which all plant and quarry operations can be plainly seen.

The Gates plant, one of the most modern in that vicinity, has had few changes made since it went into operation. Drilling is now being done, however, preparatory to lowering the quarry level another 65 ft. This will be done during the next summer, and when the new level has been sufficiently enlarged the crusher will be lowered to the new level. The use of trucks for quarry haulage will be continued.

Medusa Elevates Henry Vanderwerp, W. L. White

The Medusa Portland Cement Co. has announced the appointment of Henry Vanderwerp as vice-president, and W. L. White, Jr., as assistant general manager of that company. This is in addition to the appointment of D. H. MacFarland as vice-president, announced in the Feb. 11 issue of PIT AND QUARRY.

Mr. Vanderwerp has been vice-president and general manager of the Manitowoc Portland Cement Co. since that company opened its plant at Manitowoc, Wis., in 1924. Mr. Vanderwerp's advancement as vice-president in charge of Medusa offices in Chicago follows the connection of the Manitowoc with the Medusa group a few months ago.

W. L. White, Jr., has been general superintendent of the Medusa plants for the last six years during a period of unusual expansion. Mr. White is largely credited with the unusual progress made by the Medusa mills in accident prevention activities.

Both Mr. MacFarland and Mr. White will be located, as at present, at the general offices of the Medusa Portland Cement Co., Engineers Building, Cleveland, O.

Builds New Stone Plant Near Hopkinsville, Ky.

Ground has been broken near Hopkinsville, Ky., for the new crushed-stone plant of the Hopkinsville Stone Co., recently organized, and construction is expected to be completed by April 1 of this year. The plant will have a producing capacity of 1,000 tons per day and will employ approximately 30 workmen. Agricultural limestone is also to be produced.

A. E. Dickinson Renamed Indiana Limestone Head

At the annual meeting of the stockholders of the Indiana Limestone Co. held at Bedford, Ind., recently, A. E. Dickinson of Chicago was re-elected president and Lawrence Whiting of Chicago was re-elected chairman of the executive board. L. E. Donaldson was elected vice-president of the cut-stone department.

Wolverine Cement Co. Holds Safety Dinner

175 EMPLOYEES AT GATHERING

Officials and employees of the Quincy and Coldwater, Mich. plants of the Wolverine Portland Cement Co. gathered at Coldwater on Saturday evening, February 7, for the third annual safety banquet and program sponsored by the company. There was an attendance of 175.

Following the dinner a well-arranged program was heard before J. H. Kempster, general superintendent of Universal-Atlas Cement Co., Chicago, formerly associated with the Wolverine plants, presented the main address of the evening.

"Safety First" was the theme of Mr. Kempster's talk. The speaker referred to his own experiences in the industry, in tracing the topic from the earliest efforts of employers to guard their employees from injuries, to elaborate safety programs being carried out in large industrial plants today.

"The hardest angle of a safety program," Mr. Kempster asserted, "is to make the men see the importance of protecting themselves against possible injury. Most men, until recently, have refused to treat the subject seriously."

"Safety guards were placed on machines," he continued, "and owners thought the problem of hurt claims solved. But accidents continued to occur with surprising frequency, because workmen would not consider the advantages for safety offered by the 'newfangled devices.' "

Frank W. Murray, general superintendent of the Wolverine plant, concluded the evening's program by a short talk in which he urged the company's employees to continue practicing safety methods in their work.

Converts Port Colborne Plant to Wet Process

Canada Cement Co., Ltd., Montreal, will start work next June on the reconstruction of its Port Colborne, Ont., plant to cost $500,000. The plant will be converted from the dry to wet process of manufacture. L. M. McDonald is superintendent of the Port Colborne mill and the changes are being made under the direction of S. H. Barr, chief engineer.

O'Brien Co. Orders Two Hydraulic Dredge Pumps

O'Brien Bros. Sand & Gravel Co. of New York, N. Y., extensive producers along Long Island, have ordered two 20-in. hydraulic dredge pumps, each driven by a 550-hp. geared turbine, for use in its dredging operations in Long Island Sound. The order was placed with Westinghouse Electric & Mfg. Co.

To Show Progress of Non-Metallic Minerals

PUSH PLANS FOR 1933 FAIR

Except for an article which appeared in the Dec. 4, 1929, issue of PIT AND QUARRY, little has been said publicly concerning the recognition that will be given at the Chicago World Fair of 1933—the Century of Progress Exposition—to the great mineral industry.

The Mineral Industries Committee was appointed early by the Fair officials, with Dr. M. M. Leighton, chief of the Illinois Geological Survey, mining engineer and eminent geologist, as chairman. The committee comprised sub-committees to cover various branches such as coal mining, metal mining, metallurgy, non-metallic mineral operations and petroleum. Serious meetings were held and reports prepared. The plans were eventually submitted to and approved by the National Research Council, Washington, D. C., which had assumed the duty of passing upon all the scientific and technical exhibits.

The Fair's directors recently engaged the full-time services of a mining engineer and engineer, of wide travel and practical experience, to take complete charge of the mineral-industry features. J. Volney Lewis resigned his position as staff geologist for the foreign operations of the Gulf Oil Corp., and has undertaken active duty with an office in the Administration Building of the Century of Progress, Chicago. He has announced his allegiance to the original concept of the Exposition. He proposes to exhibit the progress that has been made since 1833 in the various branches of the world's mineral industry which embraces the beneficiation of all types of substances that occur naturally in the earth's crust. Thus it is Mr. Lewis' function to select and to install the exhibits that will represent metal mining, metallurgy, coal mining, petroleum recovery and refining, geological developments, engineering materials and materials testing, and the numerous branches of our non-metallic-minerals industry.

The "non-metallics" will be treated liberally by Mr. Lewis, to the extent of the space and financial means available for such work. Operators in the industry will find him receptive to suggestions and coöperation but they should appreciate the fact that he must keep within the scope that was prescribed by the official committee and approved by the science advisory committee of the National Research Council.

The sub-committee on non-metallic mining comprises, in addition to Dr. Leighton: J. H. Hedges, assistant to the director, U. S. Bureau of Mines, chairman; Max A. Berns, Universal Portland Cement Co.; J. E. Lamar, Illinois Geological Survey; and A. J. Hoskin, PIT AND QUARRY.

During a radio address, Feb. 18, 1931, over the N. B. C. chain, Dr. Leighton said:

"It won't be long now, before the curtain will be raised on the Chicago World's Fair, which will portray a century of progress in every line of human endeavor, with special emphasis on the contributions made by science to the progress of civilization. Then you will have a chance to see what is being done in the fields of mining and metallurgy today, and you can plan on many surprises. You will enjoy trips through realistic mines, pits and quarries; you will see oil wells being drilled. Rocks, minerals, and ores of all kinds will be shown just as they occur in nature—in their own natural surroundings. Their methods of origin will be made clear to you. Then you will see what happens to these earth materials in the separation plants, mills, and refineries which prepare them for conversion into useful articles and substances of commerce. You will see how hundreds of these articles and substances are manufactured; but you will see something else which will impress you in a different way—the great contrast between the old and the new: between the world of yesterday and the world of today, with doubtless some glimpse into the future. The use of minerals has brought such revolutionary changes in our civilization that the exhibit will, of necessity, be comprehensive, novel, and spectacular. The century from 1833 to 1933 has witnessed phenomenal developments in man's conquest of his environment—the century ahead promises a rapid rise to newer and higher levels beyond our present concepts."

River-Gravel Producer Launches New Towboat

A new towboat for the Muskingum River Gravel Co. was launched this month at Zanesville, O. The boat is the first of two planned by the company for construction this year, according to H. D. Stillion, secretary of the company.

The vessel, 80 feet over all in length, is of the paddle-wheel type with a 100-horsepower Diesel engine supplying the power.

The Muskingum River Gravel Co. has a payroll of 30 men and the entire crew has been retained for the construction of the towboats, also for repairs to barges and machinery of the company and loading equipment on shore.

Fire Causes Damage at California Lime Plant

Fire destroyed two buildings and caused damage estimated at $25,000 at the Devore, Cal., lime plant of the Pacific Lime & Cement Co. recently. Several electric motors were included in the machinery destroyed, but the rotary lime kiln was undamaged.

Gravel Association Studies Employment

AIDS PRESIDENT'S COMMITTEE

The sand-and-gravel industry is organizing to coöperate with President Hoover's emergency committee for employment and to deal with its own emergency employment problems, according to advice given to Col. Arthur Woods, chairman of the president's committee, by Robert J. Potts, president of the National Sand and Gravel Assn.

The association has named a special committee to act as a point of transfer for ideas and information applicable to employment measures among its member companies, according to Mr. Potts.

"The sand-and-gravel industry," he said, "is willing to do everything possible to further the program of the president's emergency committee for employment. Being highly seasonal in its operations and depending as it does on fluctuations in the construction field, the industry has in the past found occasion to study the problem of maintaining its working forces. During the current depression, we want to go farther in keeping payrolls at the highest possible level.

"Every sound method that we can discover will be applied to this end. The industry is being canvassed for all ideas and practices applicable to the situation. Many firms already have written to describe the methods they are using to meet the situation. We find that many plants are operating at least part time and are staggering their forces in order to spread employment as much as possible among employees normally on the payroll."

Members of the special committee appointed by the national association are Alexander W. Dann, Pittsburgh, Pa., chairman; R. C. Fletcher, Des Moines, Ia.; John Prince, Kansas City, Mo.; Hugh Haddow, Jr., Millville, N. J.; Walter L. Smith, Memphis, Tenn.; Paul Jahncke, New Orleans, La.; C. G. Besch, St. Louis, Mo.; and R. J. Windrow, Dallas, Tex.

Concrete Plant at Fort Worth Will Be Rebuilt

The Fort Worth Sand & Gravel Co., Fort Worth, Tex., which has operated a ready-mixed concrete plant since 1923, is now making plans to rebuild the entire plant, installing new machinery throughout.

Legislator Urges State Cement Plant in Indiana

Rep. John F. Ryan, member of the Indiana state legislature in session at Indianapolis, introduced a bill last week proposing the establishment of a state cement plant. The use of prison labor is proposed in the measure.

Editorials

The Cement-Trust Fantasy

AS a political gesture, made to appease the clamorous proletariat, the senate's decision to investigate the cement industry may be expected to produce the desired results. The word "trust" can still be counted on to bring fire to the eye of the average voter, and if this term of opprobrium is now leveled at the cement industry, it is probably not because of any special evidence of guilt but rather because the food, oil, furniture and other industries have already played the culprit's rôle and the cement industry's turn has come.

It is not necessary, in order to attract the searching gaze of the Federal Trade Commission, that an industry be guilty of unfair practices or of concerted action in restraint of trade. If it were, the cement industry might reasonably feel uneasy. But a suspicion of guilt is quite as effective as proof of guilt in inciting the senate to action. To the general public it is inconceivable that any industry can reach the size of the cement industry without being guilty of all the "nefarious practices" which anti-trust legislation seeks to prevent. What the country needs, in the average man's view, is not only a more rigorous enforcement of existing laws, but the enactment of countless new ones, which, by making the successful conduct of big business even more difficult than it is, shall keep all business down on the level of small-scale enterprise.

The government's effort to learn whether the cement industry is operating in violation of the federal anti-trust laws and whether it is employing unfair trade practices need occasion no alarm among cement producers, unless we seriously mistake the nature and intent of the industry's activities. Evidence more tangible than any we have seen will be necessary to convict the cement industry, or any considerable number of individual producers within it, of following illegal methods. We are confident that the government is entering upon what is only another one of its numerous attempts to show that a large industry is necessarily a wicked industry and that, without the threat of outside policing, business men can not be trusted to be either reasonably honest or socially useful.

Apparently the cement industry has committed the error of raising itself to a position of prominence by supplying an essential construction material at a price which has earned a fair return on the capital invested, and, for this, it will be dragged through a lengthy and annoying grilling, it will receive columns of damaging publicity, the market value of its stocks will be lowered, and its sales may be seriously affected. In an effort to preserve the "free and unrestricted competition" of the economists, anti-trust legisation would nullify the natural results of such competition by suppressing the very activities that distinguish a really free competition from monopoly.

We repeat that the cement industry has exhibited no tendencies that prove, or give reasonably certain cause for suspecting, that it is operated as a monopoly or that any group of its members is exercising a monopolistic control. It has adopted trade practices, it has fostered and indulged in commercial activities, which are common to all other large industries and are, by general agreement among business men, considered necessary for the successful conduct of large business.

The cement industry will doubtless be accused of having fixed prices, curtailed production, lobbied for tariff, and done other things supposedly in restraint of trade. It may have done all these things and the results may have had the effect of limiting trade. To uncover such facts is one thing; to prove the existence of an illegal intent behind them is quite another.

Like most other businesses, the cement industry has suffered from over-expansion, from a slackened demand for its product, from foreign competition, from price cutting, and the other evils either peculiar to the times or common to all businesses. And, like other industries, it has tried to check over-production; it has asked for tariff protection; it has organized its statistical, legislative and research activities; it has sought to widen the market for its product. But, in doing these things, it has done only what every industry must do in an effort to stabilize conditions among its members and to insure, as far as it can, the permanence and security of their investments. These activities do not justify the forming of any conclusions about the integrity of the industry indulging in them. Certainly they do not justify the drawing of an indictment against a whole industry.

It is true that cement producers have lowered prices, that they have raised prices, that they have asked for tariff protection, that they have organized themselves into a national body to shield their properties from common risks and common enemies. The desire for self-preservation is held a desirable quality among men; does it become immoral when possessed by business?

Whenever cement producers have lowered their prices, they have probably done so to stimulate sales at times when the demand for cement was low; and whenever they have raised prices, they have probably done so because increased demand had mitigated to some extent the rivalry that normally exists between competitive concerns. If such changes have been made simultaneously, or at nearly the same time, by different producers, this fact does not in itself prove that these men acted in collusion or with the intent of restraining trade or harming other business men. To an unbiased observer such concerted action would appear rather as the result of like causes having produced like effects. Similar conditions, prevailing concurrently in many places, must have similar effects on men

similarly situated and must lead them to take generally similar action. And, even if their action had been concerted, the ends sought need not have been illegal.

In the case of cement imported from abroad, what appears to be a case of only local interest may easily become a matter of concern to the entire industry. While producers along the seaboard are certain to feel the effects first and may suffer most, the results of admitting foreign cement without restriction may be felt far inland, not alone by producers who ship into seaboard territory, but even by those who ship into interior territories served also by competing seaboard producers. It is true of any large industry that local conditions may become regional and even national in their effects. Shall they not then become problems of national concern, proper subjects for concerted action through an industry's organized agencies?

For a long time the cement industry has suffered from over-expansion and, while this has been true of many other industries, conditions in the cement industry have been particularly distressing. Cement production is employing less than 65 per cent of the industry's production capacity, largely because of popular belief in the theory of "free and couraged to be foolhardy as well as adventurous. unrestricted competition" by which men are en-

Perhaps government will remedy these matters for the cement industry, now that the senate has authorized an investigation. Perhaps it will bar foreign cement by the enactment of a high cement tariff; perhaps it will require a federal permit before allowing the establishment of a new cement plant; perhaps it will regulate cement buying, remove the peaks and the valleys in the cement-sale curve and, so, stabilize prices; perhaps it will insure the financial success of the industry by protecting instead of belaboring it. But that leads to socialism and, as long as our lawmakers continue to be large owners of corporation stocks, such an eventuality need not be feared.

If government insists, then, on letting business shift for itself in order to protect itself, why not leave to it the responsibility and the initiative needed to advance itself? If government will not prevent over-production, for fear of curtailing "free and unrestricted competition," then it should let business take a hand. If government will not regulate demand in proportion to supply, perhaps it will let industry regulate supply in proportion to demand. If government will not stop the importation of highly competitive foreign cement, why not let business handle the situation in whatever way seems cheapest and most effective?

Government can not continue indefinitely to exact from business a strict adherence to an economic code wholly out of tune with modern business conditions and not allow it reasonable freedom of action in managing its own affairs. Government can not hope to collect an ever-increasing profits-tax from business, if it curtails business enterprise and limits its profit-making opportunities.

Small Cement Plants

THE construction of two small-capacity cement plants in Mexico has revived interest in the small plant as a possible means of solving some of the problems of over-expansion that have beset the cement industry. While there has never been any general advocacy of the small plant on the score of economy in production, it has had some adherents. The theory of its proponents has been that the small plant, because of its low overhead and the necessarily small territory it might serve, could be operated more economically, would be less susceptible to wide fluctuations in the demand for its product, and could be erected with a greater certainty of profitable operation than a large plant.

These are important considerations, but whether they are practical or merely theoretical remains to be seen. There is no doubt that the establishment of a large plant, apart from the problem of raising the necessary capital, involves great risks. In order to support a large production capacity a large market or large markets must be found, and in order to maintain production on a large and profitable scale a fairly stable demand must be found or created. In normal times and in an industry normally developed these are points demanding close study; in the cement industry, from 30 to 40 per cent overbuilt, they are essentials. Many of the cement industry's present troubles can be traced either to a failure to consider these points or to a deliberate ignoring of them by new-company promoters.

Operated as parts of large industry, as units in chains of plants, small establishments would seem to offer some interesting possibilities. They could, under such a plan, be economically administered; their supplies, within certain limitations, could be bought to good advantage; they would represent relatively small capital investments and, therefore, the burden of carrying them unproductive through a period of slackened business would be correspondingly light; and, if wisely placed, they would be assured of sufficient business to keep them profitably employed most of the time.

Operated singly, under separate management and with separate selling organizations, the prospect would be vastly different. Curtailment or stoppage of production might be disastrous; the setting up of new plants in the neighborhood of a small plant might provide a competition that would be ruinous; local conditions would have a more serious effect on successful operation than in the case of large plants having large and diversified selling organizations.

The new plants in Mexico are specially favored by existing conditions. Their capacity is more nearly attuned to the probable demand than is usually the case with larger plants, and they are not now, and probably will not soon be, troubled by the trials of serious competition. In spite of these unusual circumstances, however, their operation will be watched with interest, not alone by producers who may want to take advantage of similar situations, but also by large concerns that may be planning expansion on a regional or a national scale.

Unloading and setting the rotary cement kiln.

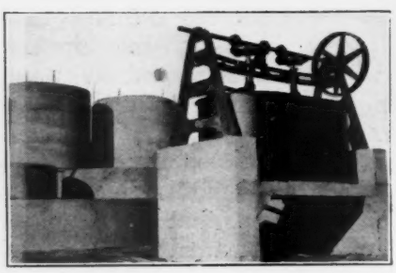
Portland-Cement Plant in Sonora, Mexico to Start Production in March

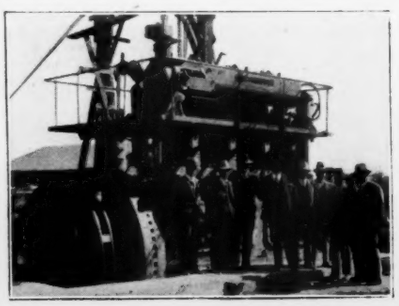
New 500-Bbl. Wet-Process Operation at Hermosillo Rapidly Nearing Completion

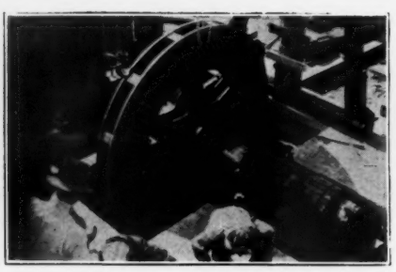
SPECIAL interest attaches to the project herein described for the reason that, although it is relatively small, it is one of the two cement plants under construction at present on this continent. The future of this project will be of interest to the industry in proving whether or not a small independent company can succeed in an isolated territory. If it succeeds, other companies may be encouraged to open quarries and erect mills in other outlying regions whose development will require cement.

Work on the new cement plant for Cemento Portland Nacional, S. A., Hermosillo, Sonora, Mexico, is nearing completion and it is expected that cement will be ready for distribution about the middle of March. The building of this project is considered the forerunner of extensive construction projects in which cement will be used along the west coast of Mexico. While the present installation is small in comparison with the plants in the United States, it will be of a size suitable to take care of the present needs of the territory it will serve, with special care being taken so that the capacity may be increased in any department without interrupting production of the units installed at this time.

The plant, with an approximate capacity of 500 bbl. per day, will be operated by the wet process, using limestone from a deposit extending several miles in length along the banks of the Rio Sonora, with the starting quarry but several hundred yards from the plant location. Clay will be used in making the mix and this material, also in a seemingly inexhaustible amount, lies adjacent to the plant location. Air for drilling in the quarry will be furnished by an Ingersoll-Rand portable compressor, direct-driven by a gasoline engine. The stone will be transported to the crusher by motor truck, the haul being short and convenient for this mode of transportation. The clay will be dug with a portable drag-line machine, and will be transported by truck to a storage space near the clay-mill where a supply, sufficient to run the plant for thirty days, will be stored. This will allow the use







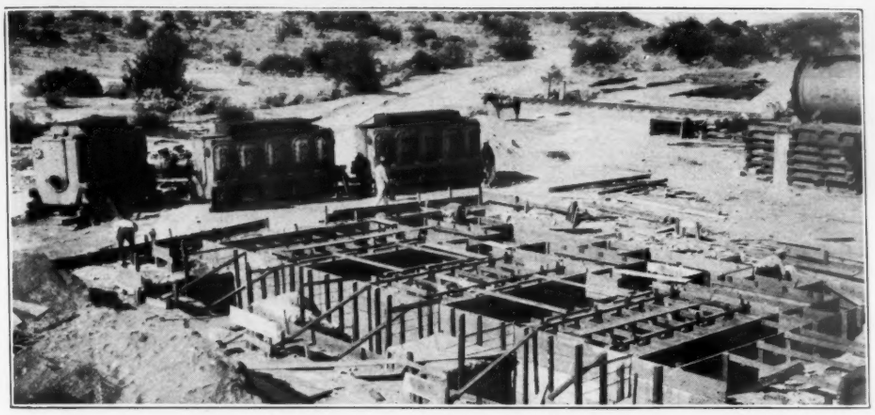
Above—Mexican officials assembled before one of the generating units.

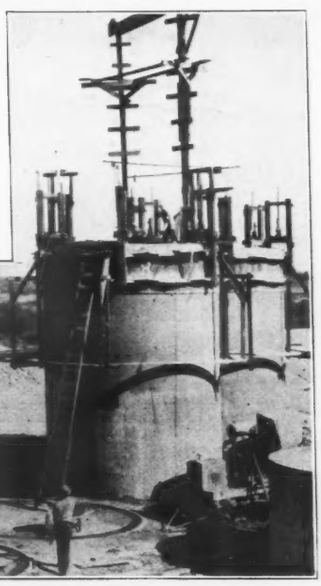
Left—Clay-mill, with slip, settling and slurry tanks at rear.

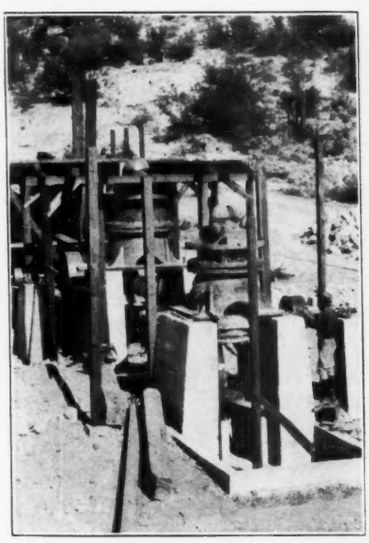
Right—Placing a generator for connection to a Diesel engine.

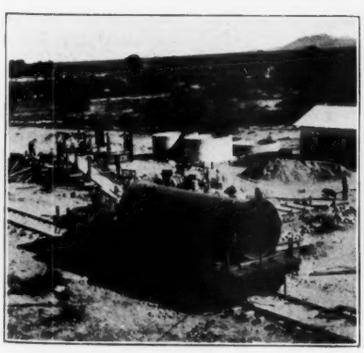
Left, reading down—Constructing the office and laboratory building; power-house foundation forms ready for concrete; setting the gyratory crushers; plant site with tube-mill on car in foreground.

Right, reading down—Erecting kiln-driving gear; kiln pier and slurry tanks under construction; the 7-ft. clay tanks with slurry-tank foundations at rear.









Setting the Diesel-engine frames on the concrete foundations.

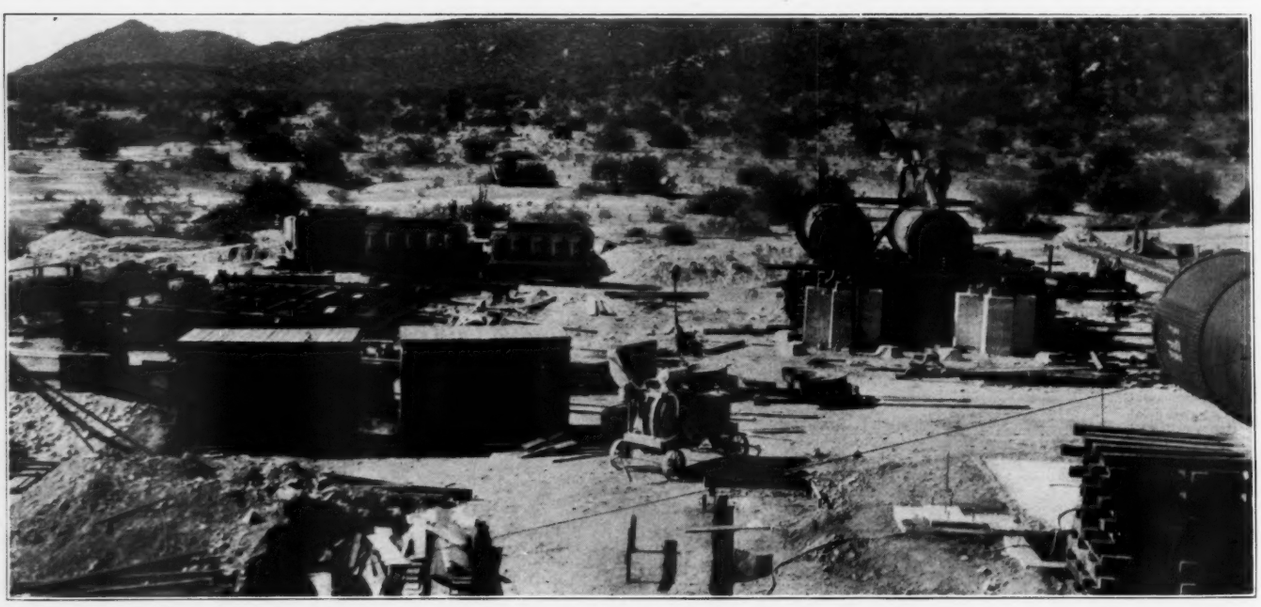
of the excavating and hauling equipment at other points about the plant during the major portion of the time.

The crushing of limestone will be accomplished first, through a 12-in. Traylor gyratory crusher, then through a 4½-in. Traylor gyratory finishing crusher. The stone will then be conveyed to the mill-feed bin or will be placed in storage. Arrangements have been made so that the crushed stone from either the primary or the finishing crusher may be loaded into railroad cars.

The raw grinding will be done by a 6-ft. by 22-ft. Traylor two-compartment mill, discharging to a Wilfley pump, this pump conveying the material to any of the four concrete slurry tanks. The agitation in the slurry tanks will be with air furnished by a Worthington single-stage compressor. Two Wilfley pumps installed at these slurry tanks will be used to transfer the slurry in the tanks and deliver it to the kiln feeder.

The kiln, 8-ft. by 150-ft. in size, will discharge to a drag conveyor which will be driven by a Westinghouse motor through a Pacific Gear & Tool Co. speed-reduction unit and which will deliver the clinker over a concrete retaining wall where it will be stored or delivered to the finish-grinding mill bin by a crawler crane having a clam-shell bucket. This same crane will load the gypsum bin. The clinker and gypsum will be fed to the Traylor 6-ft.

(Continued on page 52)



West end of plant. Power-house foundation forms at extreme left.

Senate Orders Federal Trade Commission Inquiry Into Cement Industry

COMPETITIVE conditions, or the absence of them, in the cement industry have been made the subject of investigation by the Federal Trade Commission. At the instance of Senator George W. Norris of Nebraska, the senate passed a resolution February 16, instructing the commission to investigate the cement industry and report to the senate:

"1. The facts with respect to the sale of cement, whether of foreign or domestic manufacture, and especially the price activities of trade associations composed of either manufacturers of cement or dealers in cement, or both.

"2. The facts with respect to the distribution of cement, including a survey of the practices of manufacturers or dealers used in connection with the distribution of cement.

"3. Whether the activities in the cement industry on the part of trade associations, manufacturers of cement, or dealers in cement constitute a violation of the anti-trust laws of the United States and whether such activities constitute unfair trade practices."

While the Federal Trade Commission already is considering tentative plans for the investigation, these have not progressed to where details may be stated. Francis Walker, chief economist to the commission, is ill and until he can return to his work the investigation program will not be finally approved, although there is preliminary work, such as gathering price data in various markets that may get under way at once. The commission will prosecute the investigation as rapidly as possible and the expectation is to have it completed so as to report to the next session of congress.

As the senate resolution does not call for public hearings in connection with the investigation, the commission is not likely to include these in its work.

On introducing the resolution, Senator Norris stated that the Federal Trade Commission had been receiving numerous complaints from all parts of the country, in which were suggestions that competition was restricted in the cement industry. He submitted to the senate a statement indicating the character of these complaints, from which statement the following is quoted:

"1. Telegrams from state highway commissioners stating that the action of the cement people in combining and agreeing upon price is apparent. 'We are about to advertise for our 1931 requirements and would like to know if you have any suggestions that grow out of your experience which would protect us from the customary manufacturer's practice to quote us exactly the same price regardless of location of factory or the freight haul involved.'

"2. Complaint from builders and contractors in the building trades located in Wisconsin, alleging combination among several of the large cement companies, by which prices of cement are definitely fixed.

"3. One complaint from a dealer in building materials located in Nebraska, complaining of maintenance of high prices in lumber and plaster. 'Incidentally I have been surprised that your commission has allowed the cement people of the land to maintain an absolutely rigid and uniform price over a long period of time.'

"4. A complaint from a dealer in building material located in Minnesota states that he is unable to purchase material because he is not a lumber dealer.

"5. A complaint from a dealer in Illinois that several cement companies refuse to sell him cement because he does not handle a full line of building materials. The real reason, he alleges, is because he has cut prices.

"6. A dealer in Iowa complains of price discriminations on the part of a chain building-material concern.

"7. A complaint from a New York dealer alleging a conspiracy among the members of a cement association to fix prices, which cement is to be sold in any locality. 'All companies in the East belong to the association and have fixed the price for cement laid down at Rochester, N. Y., no matter whether the cement comes by a long haul or a short one. Freight varies as much as 6 cents per hundred from some of these companies, yet they all charge the same price for cement. If cement is ordered from a company that is not represented in a certain city, the company from which it is ordered immediately appoints a dealer in that city, giving the dealer 10 cents per bbl. for handling and charging same to the consumer.'

"8. A manufacturer of cement block and building tile, located in New York City, complains that he is unable to buy cement direct from the manufacturer.

"9. A dealer in building material located in Iowa complains that he is unable to purchase cement from manufacturers at wholesale prices due to threats made by the old-line lumber yards. The real cause for refusal to sell appears to be price cutting on the part of the dealer."

There was practically no opposition to the passage of the Norris resolution in the senate. When it first was presented, Senator Hamilton F. Kean of New Jersey objected to immediate consideration, saying that he desired to suggest an amendment. The amendment proved to be worded so as to include cement of foreign manufacture in the investigation. On the eastern seaboard considerable cement is imported from foreign countries and the eastern manufacturers must meet this foreign competition. Since the foreign product is a factor in

(*Continued on page 31*)

New Motor Development for Preliminary and Fine-Grinding Machinery

By R. S. WRIGHT
General Engineer, Westinghouse Electric & Mfg. Co.

THE synchronous motor has long been recognized as the most desirable type of drive for the grinding machinery used in the manufacture of Portland cement because it may be designed to operate at the low pinion-shaft speeds with high power factor and efficiency. However, these vertical roll, ball, tube and compartment mills require high starting and pull-in torques and, in most installations, low starting current is of utmost importance. A synchronous motor of standard type cannot be designed to develop the necessary torques with low starting current. This makes necessary the use of an intermediate mechanical member—such as a clutch or brake band—for accelerating the load after the motor is started and synchronized.

The load on a tube or compartment mill for a given speed is determined almost entirely by the weight of the grinding media or charge which remains in the mill at all times. It is apparent that when the mill has been accelerated to approximately full speed, the driving motor must develop a pull-in torque equal to or greater than normal running torque. The required starting torque is variable, depending upon the condition of the mill bearings and the weight of the charge. While the required starting torque is often as low as 125 per cent of the normal running torque, it is desirable to anticipate the worst conditions and provide starting torque in the order of 180 to 200 per cent.

The term low speed refers to 450 r.p.m. or less. Values of torque are expressed as percentages of rated load torque.

A unity power-factor, low-speed synchronous motor for compressor service delivers about 50-per cent starting torque, 40-per cent pull-in torque, and 150-per cent pull-out torque, with a current inrush of 275 per cent of rated full-load current when started on full voltage. The ratio of starting torque to kva. is $50/275 = 0.18$.

A motor of similar rating and speed but developing 190 per cent starting torque and 110 per cent pull-in torque, would have a current or kva. inrush in excess of 650 per cent or a ratio of starting torque to kva. of $190/650 = 0.29$. The frame size of this latter motor would correspond to a compressor motor of almost twice its rating. Current-inrush values of this order are often prohibitive in cement mills. Each mill motor represents a considerable portion of the total connected load and few power companies will permit these heavy peak loads to be imposed on their lines.

In a cement plant which has its own generating equipment, getting these motors started is an even more serious problem, as the starting load is more likely to cause a severe voltage drop which will result in other equipment being thrown off the line. The use of a clutch or other intermediate starting member adds to the mechanical complications and maintenance of the drive, and leaves much to be desired. Design engineers have been working to perfect a motor having the desirable running characteristics of a standard synchronous motor yet capable of developing the necessary high starting and pull-in torques with low current-inrush. After several years of research work supplemented by field tests, such a motor has been developed and is now available to the cement industry.

The new motor is a highly efficient salient-pole synchronous machine having starting and accelerating characteristics similar to the well-known wound-rotor induction motor. The desirable starting and accelerating characteristics result from the use of a damper winding of special form. This damper winding consists, as usual, of a single conductor per slot in the pole face but, instead of being connected to short-circuiting end rings, these conductors are phase-connected, with the ends brought through sliprings to an external starting resistor. The rotor of such a motor is shown in Fig. 1. To further increase the ratio of starting torque to starting current, the rim to which the poles are bolted is made up of thin laminations bolted between heavy one-piece end-plates, and the field is open-circuited during starting. The laminated-pole rim minimizes the eddy current in this member, while opening the field circuit results in a high power factor during starting as compared to that obtained with the field winding closed upon a resistor in the ordinary manner.

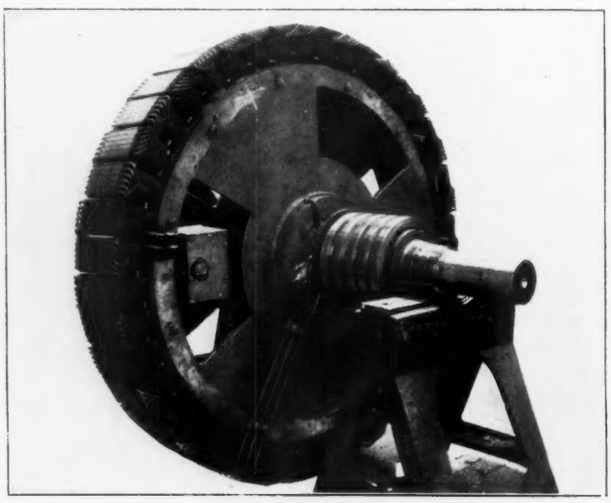


Fig. 1. Rotor of synchronous motor. Note phase-wound damper winding.

The practice of open field starting results in a high

voltage being induced in the field winding by transformer action. The magnitude of this induced voltage is dependent upon the number of field turns in series and has, in some cases, been reduced to a safe value by employing a low voltage source of excitation (45 or 55 volts d.c.) and a field winding having relatively few turns. Since the induced voltage is a maximum at standstill and decreases to zero at rated speed, it is only necessary to reduce the number of field turns connected in series from zero to approximately three-fourth speed. In the new motor, a centrifugally operated switch, mounted in the rotor, opens the field winding in sufficient places to reduce the induced voltage to a safe value, thus permitting the use of standard excitation voltages—125 or 250 volts d.c. The control is so arranged that it is impossible to apply primary voltage with this switch closed, thus preventing starting the motor with all sections of the field winding connected in series. This switch is adjusted to close at approximately 85 per cent of rated speed and to open at 35 per cent of rated speed. With this adjustment of the switch, the field may be connected to a discharge resistor and opened in the usual manner by the field switch on the control panel. The centrifugal or sectionalizing switch is enclosed in a dust-tight, welded-steel housing and mounted in the rotor as shown in Fig. 1. The collector rings are enclosed in a rugged, dust-proof housing for safety and also to reduce brush wear in dusty locations. Fig. 2 shows a completely assembled 800-h.p., 187.5-r.p.m. motor of standard mechanical construction with two pedestal bearings and a welded-steel bedplate.

The following data from tests taken on two typical ratings for cement-mill service are of interest:

Horsepower	300	350
Speed	164	400
Power factor	100%	80% (leading)
Starting torque	169%	152%
Locked or starting kva.	280%	*208%
Ratio starting torque to kva.	0.60	0.73
Starting torque	230%	190%
Starting kva.	396%	*269%
Ratio starting torque to kva.	0.58	0.71
Pull-in torque at 5-per cent slip	122%	118%

* Starting kva. based on 100- per cent power factor.

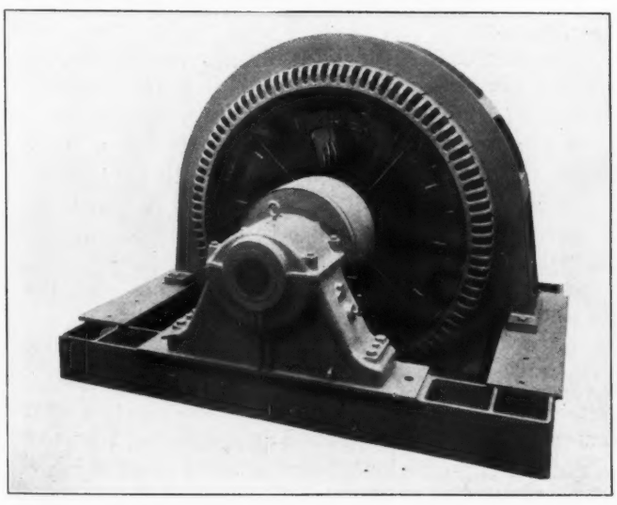


Fig. 2. An 800-hp., 100-per cent power factor synchronous motor.

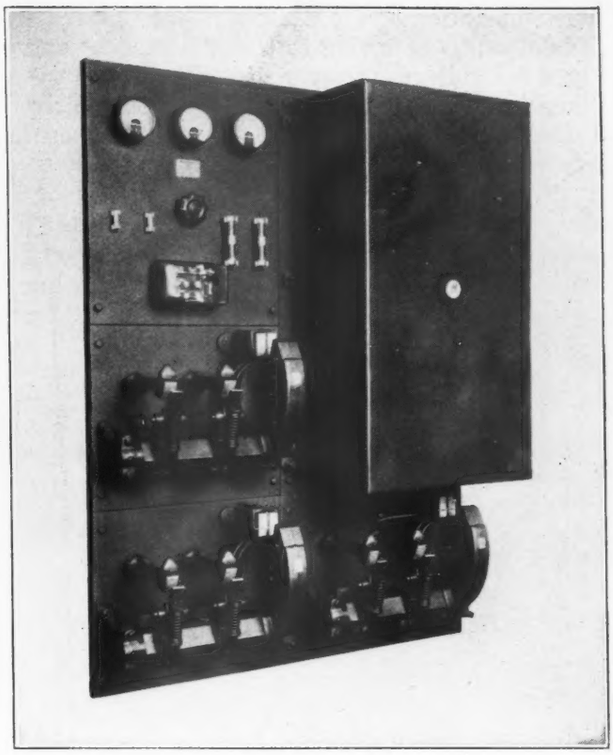


Fig. 3. Controller for synchronous motor showing secondary contactors.

An outstanding feature of this motor is the ease with which the starting torque may be varied between wide limits, to meet the requirements of the load, thus imposing no unnecessary stress or shock on the mill shaft and gearing. The two values of starting torque shown above for each motor result from shifting taps on the grid-type starting resistor.

The extent of improvement in starting torque to kva. ratios resulting from the new construction may be appreciated by comparison of the value 0.60 for the 300-h.p., 164-r.p.m. motor described above with the value 0.30 considered good for a motor of standard construction and similar rating. As compared with the compressor motor discussed earlier, the new motor delivers over three times the starting and pull-in torques with the same starting kva.

The results obtained with this new motor depend, to an unusual extent, upon proper functioning of the control equipment. The controller is of full automatic type with sequence of switching operations controlled by a motor-driven-drum master switch. The controller employs a primary switch, field switch and discharge resistor, auxiliary and protective relays, two or more accelerating contactors and a starting resistor in the damper winding circuit, a spring-closed auxiliary field switch, and over-load relays of inverse current and thermal types. All relays, interlocks, field contactors and the master-drum switch are mounted under dust-tight covers. Fig. 3 shows a typical Simplex motor controller with three secondary contactors. In this case the primary switch is mounted on a separate pipe framework.

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The operation of the equipment may be readily understood by referring to the speed-torque curve Fig. 4-A and the elementary controller diagram 4-B. When the start button is closed, the motor-driven master-drum starts to rotate and causes the auxiliary field switch 41-A to operate and open the field circuit which is already sectionalized by the centrifugal switch CS. The primary switch No. 5 closes,

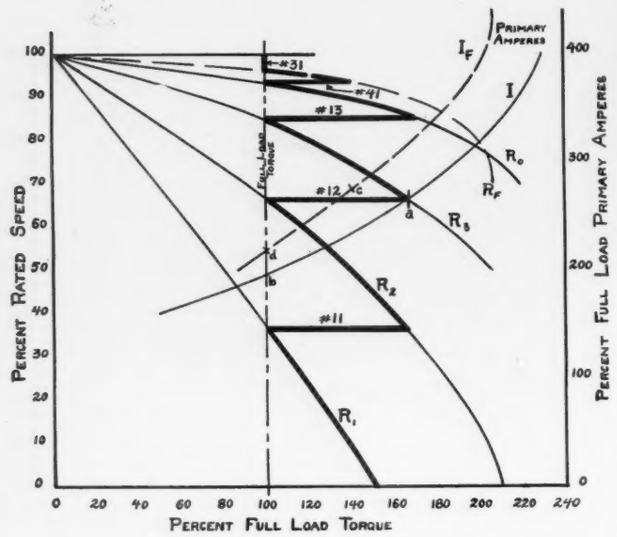


Fig. 4-A. Speed-torque curve.

applying full-line voltage to the primary winding with sufficient resistance in the damper winding circuit to give the desired initial torque, for example, 150 per cent with 250-per cent current. If the torque developed on the first point will not start the load the motor remains at rest a few seconds until the master switch operates No. 11, thus transfer-

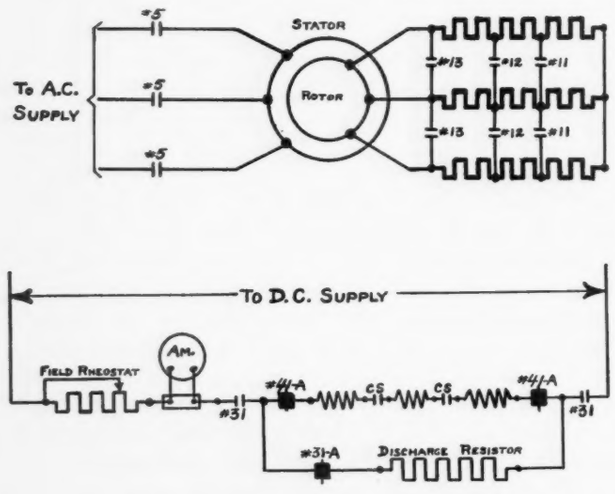


Fig. 4-B. Elementary controller diagram.

ring operation to curve R_2 giving a standstill torque of 210 per cent with 350-per cent current. Should this torque be insufficient to start the load, an overload relay will remove the motor from the line.

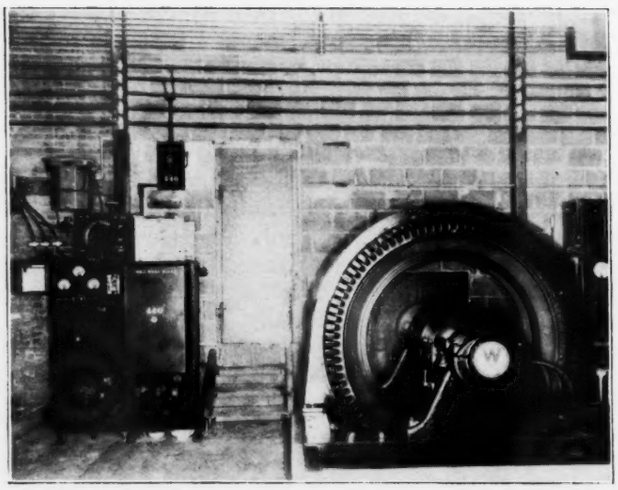


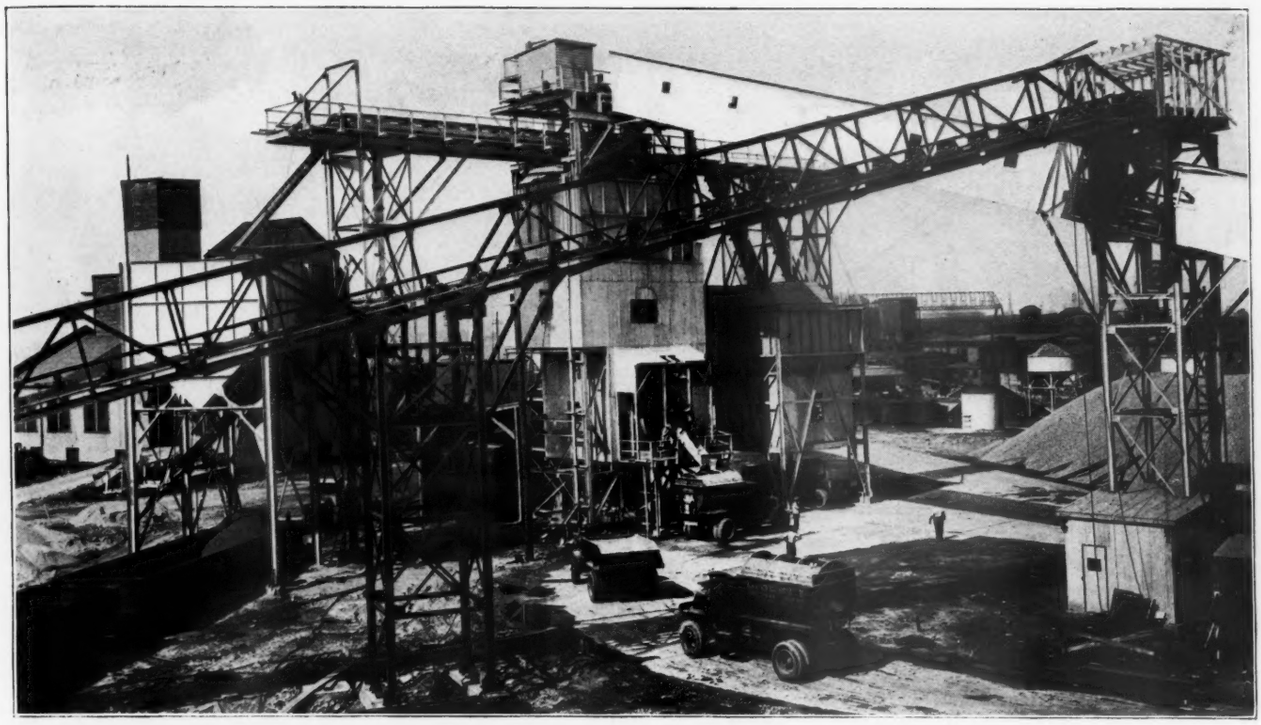
Fig. 5. A 300-hp. synchronous motor and controller at left.

If 150-per cent torque is sufficient to start the load the motor accelerates along curve R_1 until a balancing speed is reached at the load torque. The motor operates at this speed until the master switch operates No. 11 to cut out part of the secondary resistance and transfer operation to curve R_2. The motor accelerates along R_2 to 100 per cent load, then after a predetermined time No. 12 is operated and the motor accelerates along R_3 to the balancing speed after which No. 13 is operated to short out all the secondary resistance and the motor accelerates along R_0 to approximately 93 per cent speed. Before this speed is reached the field sectionalizing switch (CS) will have operated to connect the various sections of the field in series. At a predetermined interval after closure of No. 13, the auxiliary field switch is deenergized, closing the field on a suitable resistor and the motor operates on curve R_F. Before transfer to curve R_F the primary current varies between a and b on curve I and after transfer to R_F between c and d on curve I_F. The motor is now operating near synchronism and, when the field switch No. 31 is finally closed, the motor synchronizes and thereafter operates as an ordinary synchronous motor.

The control is entirely automatic and all responsibility for correct starting is taken from the hands of the operator who merely manipulates a start-stop pushbutton located at any convenient point. Since the charge in tube mills must be renewed from time to time, a limited amount of "inching" is provided in the controller to permit the operator to "spot" the mill.

Fig. 5 is an installation view of a 300-hp., 164-r.p.m, 100-per cent power factor motor, installed in 1929. The control equipment is shown on the left with two secondary accelerating contactors, a back-of-board oil immersed primary switch and the starting resistor mounted above the panel.

This highly-efficient, mechanically-simple motor with its desirable starting characteristics will fill a distinct need in the cement industry.



The central-mixing, dry-batching and car-loading plants; cross conveyor from crushing plant to main conveyor in foreground.

Produces Aggregates and Central-Mixed Concrete for Philadelphia Area

Liberty Corp. Expands Activities; Operates Largest and Most Modern Dredge in East

IN a year of general business depression, when expansion of industrial enterprises was the rare exception rather than the rule, the Liberty Corp. of Philadelphia, Pa., successfully embarked on an ambitious program of development by abandoning its former position as a mere distributor of building materials and entered the field as a complete organization for the production, transportation and distribution of commercial sand, gravel, and central-mixed concrete. Originally incorporated in February, 1928, its material yard at the foot of Orthodox St. on the Delaware River was opened in April of the same year. Operations in distributing sand and gravel continued through 1928 and 1929 but, following the merger of the two largest producing companies in this general territory, the Liberty Corp. decided upon its program of expansion into the producing field.

For this purpose and to supplement its existing facilities, an all-steel dredge and a fleet of steel barges were constructed and put into operation May 4, 1930. In the following months a central concrete-mixing plant, a railroad-car loading plant, a crushing plant for the reduction and screening of oversized stone, and all appurtenant conveyor systems, feed hoppers, railroad trackage and concrete driveways, electrical equipment and the like were completed and placed in operation.

The entire operation, with the exception of the dredge, is located on the 10½-acre tract formerly used only for distributing and storage. The general layout and the detailed design of each plant were made by the company and provide for the furnishing of all sizes of loose materials, dry batches, central-mixed concrete, and loading of railroad cars. The entire operation is unusually flexible and compact.

Dredging operations, at present, are conducted at extensive gravel banks in the Tullytown-Morrisville district along the Delaware River about twenty miles above the distributing plant. The overburden averages from ½ to 3 ft. in thickness. The material is about 60 per cent sand and 40 per cent gravel, with approximately 12 per cent of the latter being over commercial size.

The dredge is of the bucket-ladder type and was designed and built by the Dravo Contracting Co. in coöperation with O. R. Fischer, chief engineer of the concern. Parts were made in Pittsburgh and assembled at Wilmington, Del., where the dredge was launched. It is probably the largest and, without question, the most modern dredge in the East.

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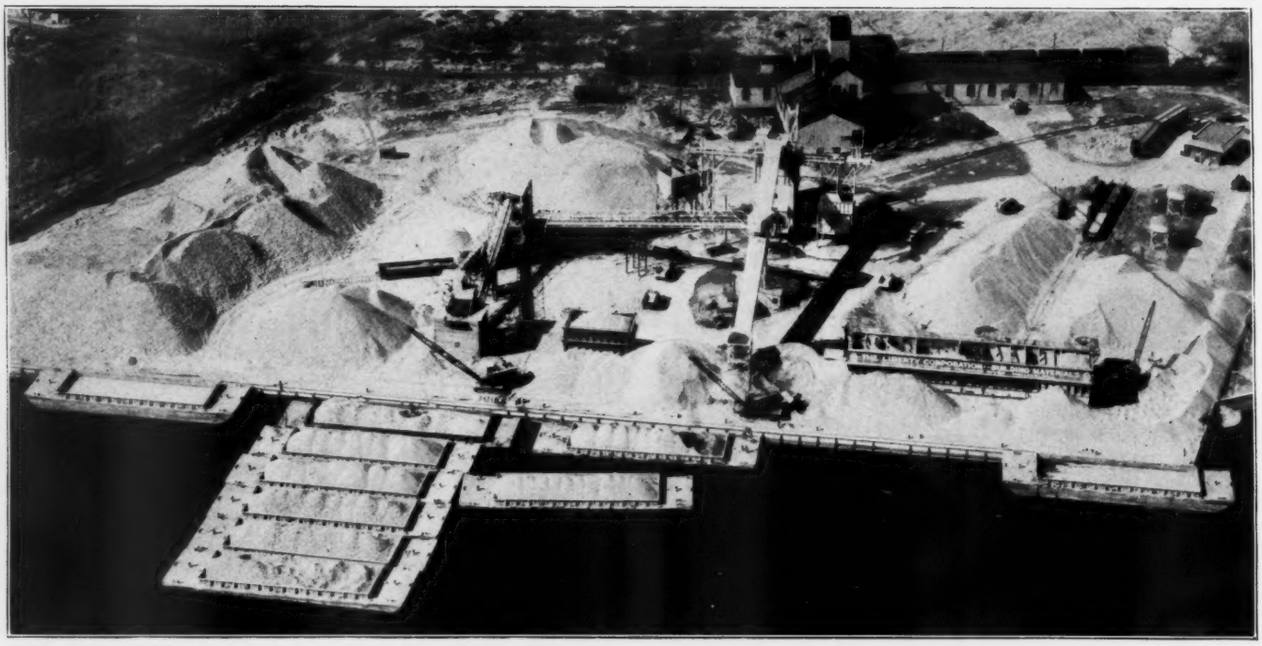


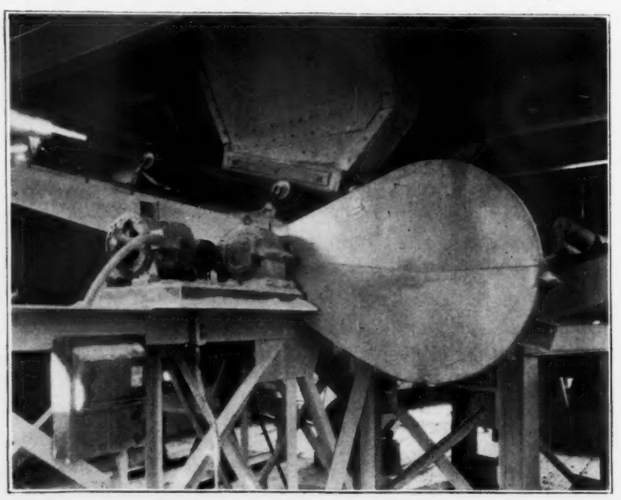
Aerial view of the company's yard, showing barges being unloaded at dock. Crushing plant at left, concrete plant in center, offices and truck-loading bins at right.

Features incorporated in its design were drawn from the long experience of the Keystone Sand & Supply Co. (which operates a number of similar dredges near Pittsburgh) and of Mr. Fischer who, for years before accepting his present position, was chief engineer for the Van Sciver Corp. of Philadelphia.

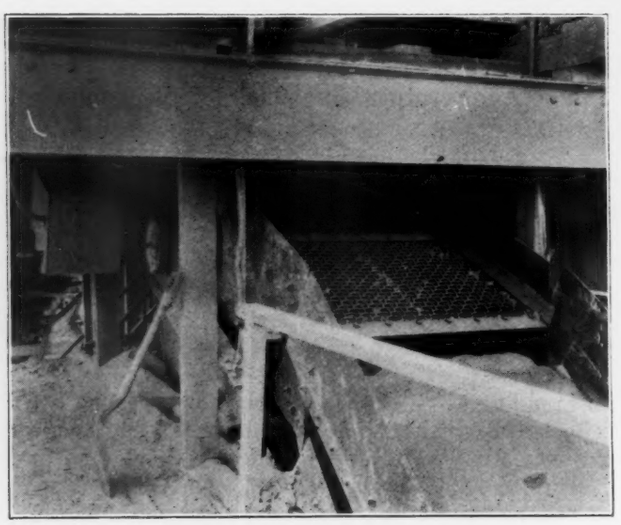
The hull of the dredge is built entirely of steel. Three steam boilers generate 320 hp. for two Skinner uniflow engines. The larger steam engine provides power for the ladder drives, main washing pumps, and a Westinghouse generator. The smaller steam engine is used to drive an 8-in. Morris sand pump which disposes of the muddy tailing waters. The electric power produced by the generator is used to drive secondary elevators, conveyors and screens. Two smaller generating sets are used for lights, refrigeration and repair work.

The ladder dumps the material over a sloping bar grizzly with 8-in. spacing into a primary washing tank. A second but smaller bucket ladder takes the washed material from this tank to the main 8-ft. by 32-ft. revolving screen with a sand jacket.

The sand is flumed into a settling tank, from which it is taken by an elevator and discharged through a chute into barges. The oversize gravel is carried by a belt conveyor to another chute to barges. The commercial gravel drops from the screen into another wash-tank and is then elevated to a Niagara triple-deck vibrating screen for final washing and sizing. The various sizes pass through separate chutes to barges. The dredge has an exceptionally large capacity and is capable of producing any sizes of material desired. At present graded commercial sizes known as 1½-in., ¾-in., ⅝-in., and ½-in. gravel as well as concrete and masons' sand are produced.



The chain and speed-reducer drive at the tail pulley of the grit conveyor.

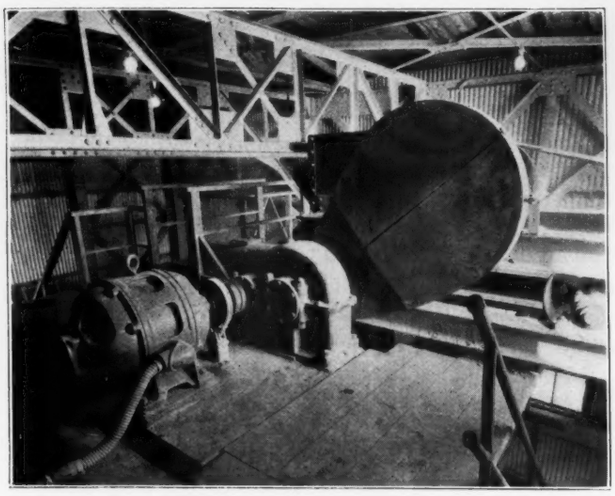


The double-deck vibrating sizing screen.

DeLaval centrifugal pumps furnish wash water. Westinghouse motors and electrical equipment are

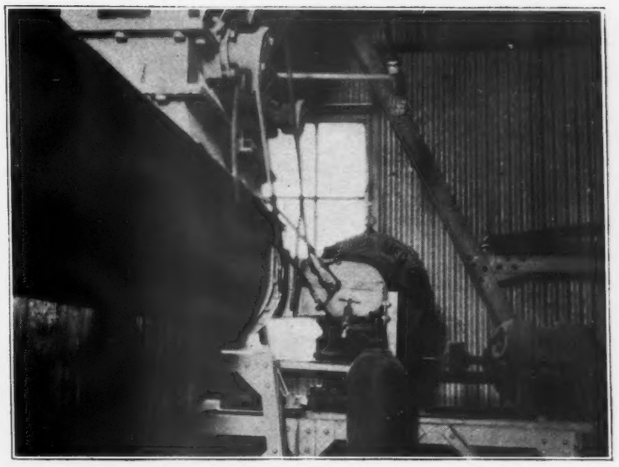
used throughout. All chutes are rubber lined. Comfortable living quarters for the crew are provided as well as a modern cook's galley and other conveniences.

Hauling of the material is done by thirty 750-ton-capacity Dravo steel barges and two tugs each of which is powered with a 100-hp. Wolverine Diesel engine. Each tug hauls six loaded barges downstream to the plant. The barges are tied up at the plant to a 750-ft. concrete dock for unloading. The unloading is done by a Link-Belt K-55 gasoline crawler crane handling a 1½-cu. yd. Owen clamshell bucket and a McMyler-Interstate electric locomotive crane handling a bucket of the same size.



A typical chain and speed-reducer drive.

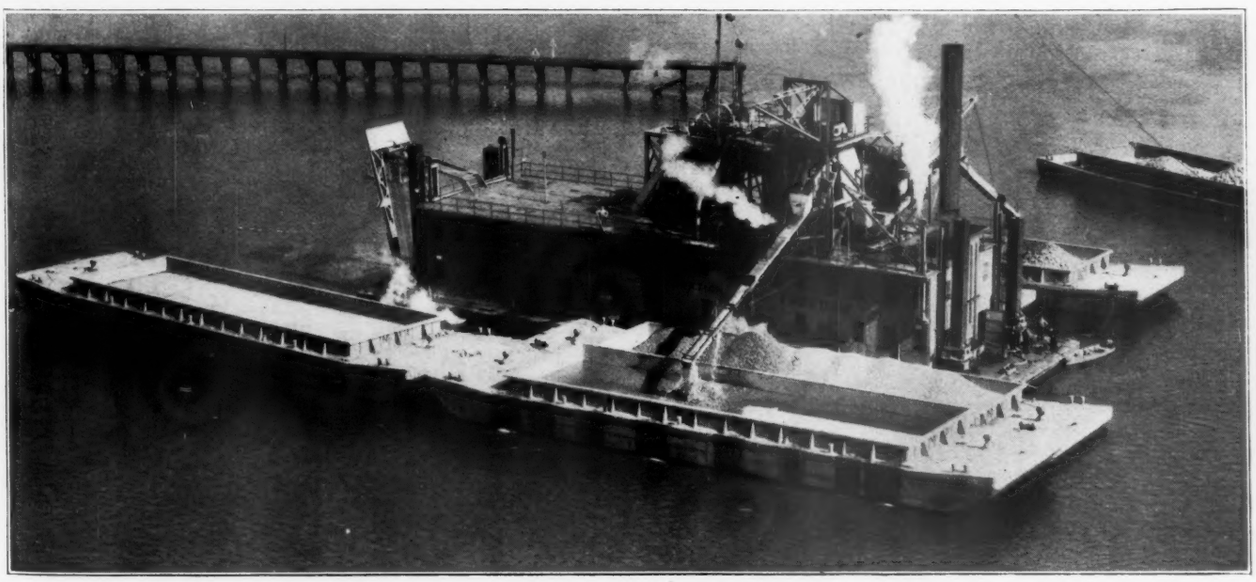
The McMyler crane is used to unload sized gravel and sand from the barges either to the battery of truck-loading bins or to the distributing plant hopper. The Link-Belt crane handles the oversize stone to the hopper of the crushing and screening plant. These hoppers and bins are located in a row parallel to the dock at a suitable distance to allow efficient operation of the cranes. The truck-loading bin units are of timber construction on concrete foundations. The larger of these units has eleven compartments, while the smaller has three compartments and their combined capacity is 5,000 tons. Both these units have steam coils in the bottoms and sides and open jets at the gates so that material may be handled during freezing weather. A boiler near the larger bin unit furnishes the steam.



The screw conveyor which feeds cement from storage to the weighing batcher.

As previously stated, the oversize stone from the dredge is discharged to a steel hopper over the crusher, first passing over a grizzly with 7-in. spacing. The material passing through the grizzly feeds from the hopper direct into a Symons 4-ft. cone crusher. This crusher is direct-driven by a 100-hp. motor. When desired, material can be by-passed through the crusher feed hopper to the main storage conveyor.

The crusher discharges onto a 30-in. inclined belt conveyor on 143-ft. centers to the screening plant. Here it discharges onto a Niagara 4-ft. by 8-ft. double-deck vibrating screen. The oversize is chuted to a 20-in. inclined belt conveyor on 144-ft.



The dredge "Freedom" on the Delaware River loading sized material to several barges simultaneously.

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centers which reconveys this material to the crusher for recrushing. The stone passing the top deck of the screen and retained on the second deck is chuted to a 30-in. inclined belt conveyor on 160-ft. centers which, in turn, discharges to the main conveyor to the distributing plant, where it can be mixed with the regular gravel or can be sold separately as crushed gravel.

The stone passing this screen continues to a

The 3-cu. yd. concrete mixer discharging to one of the agitator trucks. Dry-batched material being loaded at right.

Niagara 4-ft. by 8-ft. single-deck vibrating screen with ¼-in. mesh cloth. The stone retained on this screen, at present, is chuted to a Specialty Eng. Co. portable stock-piling conveyor which discharges to a pile alongside the building. Later a permanent conveyor will be installed. The material passing through the second screen is known as grit. This discharges through a chute onto a 20-in. stock-piling conveyor on 50-ft. centers, which discharges to a second stock-pile. A Barber-Greene stock-pile loader recovers material from both stock-piles into trucks for shipment.

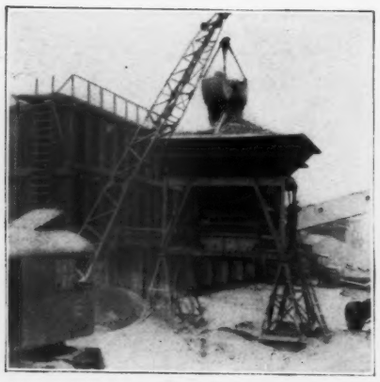
The entire crushing and screening plant is of structural steel on concrete foundations. Corrugated-metal siding and roofing are used. The Niagara screens are driven through Texrope drives and the belt conveyors through combined Link-Belt Sykes herringbone gear reducers and totally-enclosed chain drives. The return conveyor to the crusher is driven by a 7½-hp. motor and the two 30-in. conveyors from the crushing plant and to the distributing plant are driven by 40-hp. motors. The grit stock-piling conveyor is driven from its tail pulley.

As previously stated, the McMyler crane handles materials from the barges to the truck-loading bins and to the distributing plant hopper. The crane discharges to a steel hopper which feeds the 30-in., 185-ft.-centers, inclined conveyor to the plant. This discharges to a 30-in. shuttle conveyor on 50-ft. centers which discharges to the dry-batching, concrete mixing or carloading plants, as desired. The main conveyor has a Link-Belt speed reducer and is chain-driven by a 40-hp. motor. The shuttle conveyor is driven by a 7½-hp. motor.

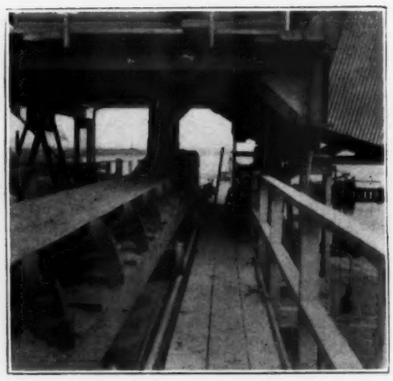
The dry-batch, concrete mixing and carloading plants are in a row perpendicular to the line of the main conveyor with the concrete mixing plant in the center directly under the discharge end of the conveyor. The carloading plant consists of a Butler three-compartment steel bin with a total capacity of 400 tons. It loads directly into cars on a siding under the bins. Excess material for storage is loaded into gondola cars and handled to stock-piles by a Moore gasoline Speedcrane handling a Blaw-Knox ¾-cu. yd. clamshell bucket.

The dry-batching unit consists of a Blaw-Knox two-compartment steel bin with a total capacity of 300 tons. The batching floor is supported on the framework of the bin and is enclosed in corrugated-metal siding. Aggregates are weighed in a Blaw-Knox two-compartment 6-ton-capacity weighing batcher equipped with a Howe scale and a Weightograph attachment for quick and accurate reading. This discharges into trucks for delivery.

The mixer building also is of all-steel construction on concrete footings and has Armco corrugated-metal siding. The Blaw-Knox four-compartment steel bin has a capacity of 300 tons of aggregate in three of its compartments and four carloads of cement in its fourth compartment. The cement is purchased in bulk and is unloaded by a power scoop from the cars to the boot of a steel-enclosed Sprout-Waldron chain-bucket elevator which discharges to the storage bin. The elevator is gear-driven by a 15-hp. motor.

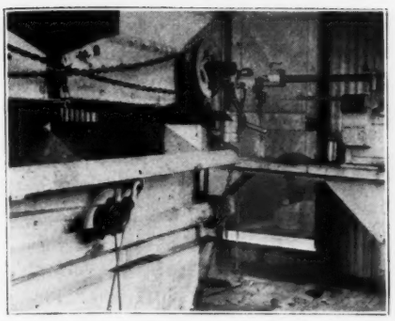


Crane handling stock-piled aggregates to truck-loading bin.



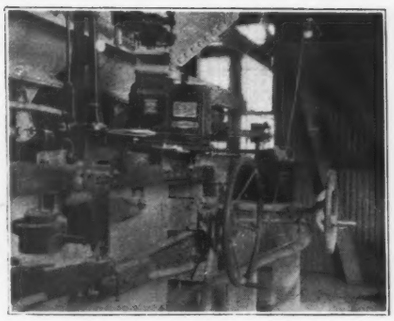
Shuttle conveyor which distributes sized material.

Crane handling stone from barges to crushing plant.



The weighing batcher at the truck-loading plant.

The stock-pile loader used for truck loading.



The weighing equipment at the concrete plant.

Cement is fed from its bin through two Fuller-Kinyon rotary valves to a 16-in. Sprout-Waldron screw conveyor which feeds to the cement weighing batcher. Air jets insure free flowing of cement from the bin. The cement screw is driven through a James worm-gear speed reducer by a 7½-hp. motor.

The cement feeds to a 3,000-lb.-capacity Blaw-Knox weighing hopper, and the aggregate through arc gates to a 4-cu. yd.-capacity hopper of the same make. Each of these has a Howe scale with a Weightograph attachment. Water is measured in a 150-gal.-capacity Ransome syphon-type tank. The

Agitator truck delivering concrete to a large sewer-construction job.

batchers and the tank discharge into the Ransome 3-cu. yd. concrete mixer which is driven by a 60-hp. motor through a Morse silent-chain drive. Deliveries of the concrete are made by a fleet of trucks equipped with Blaw-Knox 4-cu. yd.-capacity agitator bodies.

Deliveries of concrete are made to the entire metropolitan area of Philadelphia. Aggregates are delivered to the same area by truck or direct by barge from the dredge. Car shipments of aggregates cover eastern Pennsylvania, southwestern New Jersey and northern Delaware. In addition to the units previously described, there is a small Blaw-Knox two-compartment bin with a single weighing batcher and two smaller truck-loading bins with volume batchers. These are served by the Moore Speedcrane. There is also a neat brick office building which houses the general office, several private offices and the scale room. Howe scales equipped with Weightograph attachment are used for weighing all truck shipments. To facilitate the movement of trucks about the yard, there are 5,000 sq. yd. of concrete driveway serving all of the units.

The entire operation is of the most modern construction, with structural steel framework and concrete building and machinery foundations. All conveyors are speed-reducer and enclosed chain-driven. Westinghouse motors are used exclusively with Falk flexible couplings on every motor drive shaft. All belt conveyors were furnished by the Link-Belt Co. and have Timken roller-bearing idlers. Each long conveyor has a gravity take-up and Goodrich Long-life conveyor belting is used exclusively.

Senate Orders Cement Inquiry

(*Continued from page 23*)

the eastern markets, Senator Kean believed it should be included in any investigation of prices and this proposal was accceptable to Senator Norris.

A. C. Toner, manager of the Washington office of the Portland Cement Assn., had no comment to make regarding the investigation. He pointed out, however, that the association has nothing to do with prices.

With the federal government making substantial increases in the appropriations for public construction and road building, the demand for cement during the next 12 months is likely to be materially stimulated. Persisting reports from many sections of the country of uniformity in prices quoted by the cement manufacturers have been viewed as "highly indicative of an arrangement, understanding, or agreement between and among the various manufacturers and dealers in cement arbitrarily to fix and maintain prices." It is understood that one consideration in seeking the investigation at this time was to stimulate competition in connection with the extensive highway-building programs to which federal aid is extended.

Mica Deposits Discovered on Kola Peninsula in the Arctic

An expedition of the Institute for Northern Exploration has discovered extensive deposits of mica on the Kola Peninsula in the Arctic, in a hitherto unexplored mountainous region extending over an area of 1,500 square kilometers.

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Mining, Crushing Methods and Costs at a Pennsylvania Stone Quarry*

By JOSEPH A. CONWAY
Consulting Engineer, U. S. Bureau of Mines

This paper is one of a series dealing with the mining and crushing methods and costs of the nonmetallic industries, prepared under the sponsorship of and in coöperation with the U. S. Bureau of Mines. The quarrying methods described are those at a trap-rock quarry which produces annually from 450,000 to 500,000 tons of crushed stone. This property is located three miles east of Birdsboro, at Monocacy, Pa., and is one of the three quarries operated by the John T. Dyer Quarry Co. Throughout the paper an effort is made to explain the various methods used and the cost of operation.

IN 1890, John T. Dyer, operating a limestone quarry at Howellville, was forced through the demands of the railroads to seek harder rock for ballast. He delegated several of his men to scour the country for stone to meet these requirements. One of these men, William Johnson, superintendent of the Howellville quarry and former resident of Berks County, recalled that, at the time the Wilmington and Northern Railroad was being built, several contractors encountered considerable difficulty in excavating a deep cut through a hard rock about one mile south of Birdsboro. Johnson investigated this rock and found it to possess the qualities which he sought. Dyer approved the location, and the railroads were satisfied with the hardness of the rock. Therefore, after securing a lease of the property in 1894, a plant was erected and started. In 1911, because of the necessity of increasing production and the desire to secure a site on another railroad, the John T. Dyer Quarry Co. purchased a property on the same trap-rock dike about three miles to the west. In 1906 competitors started operations about three miles east of the Birdsboro quarry. This property was taken over by the John T. Dyer Quarry Co., from the

* Abstracted from U. S. Bureau of Mines Information Circular 6405.

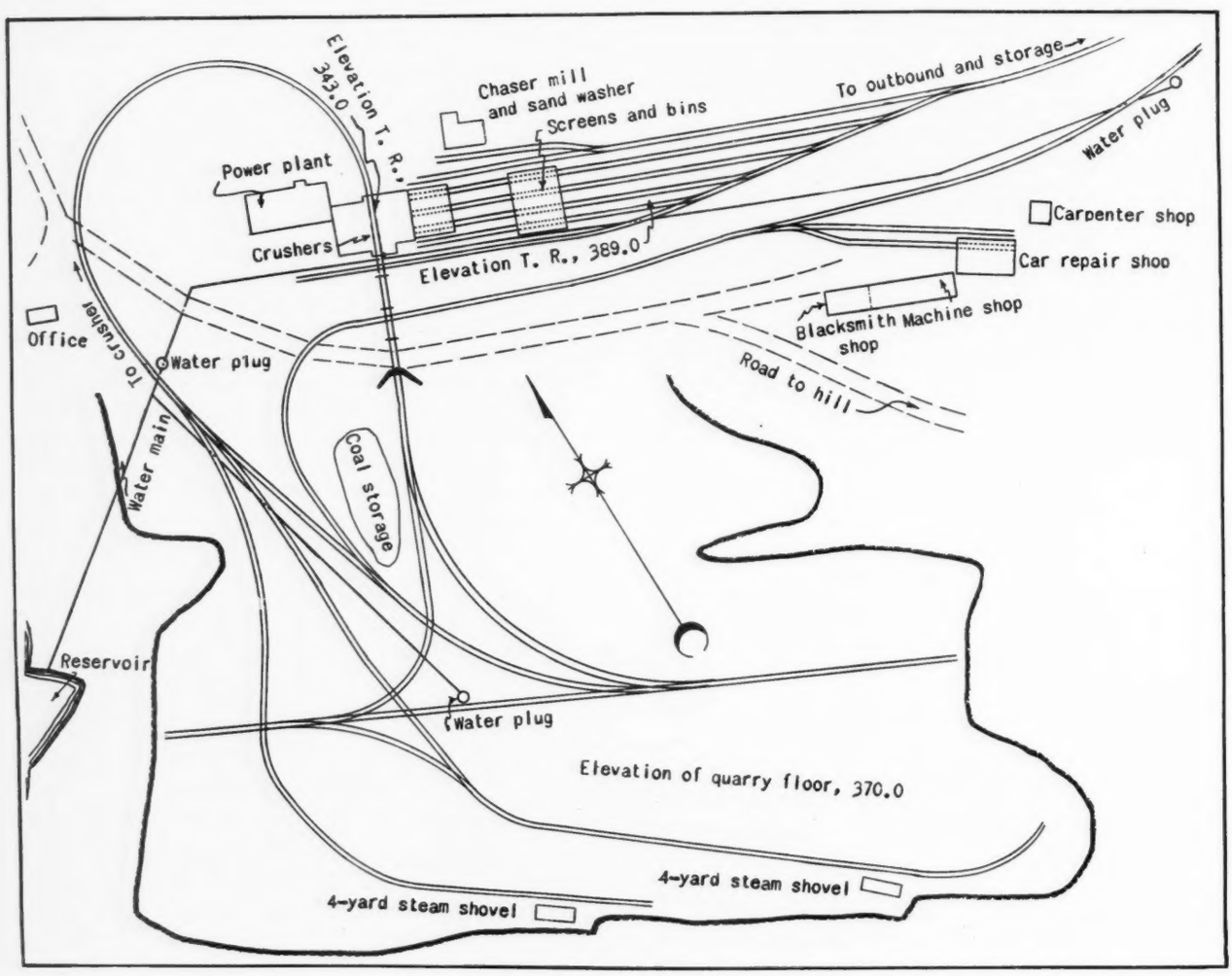

Fig. 1. General plan of the Monocacy quarry.

Birdsboro Stone Co., in 1925 and is known as the Monocacy quarry.

The engineering staff, which consists of two engineers and two assistants, performs all the engineering work for the three plants.

The rock quarried by the John T. Dyer Quarry Co. is known as trap rock. Trap rock is a general term used to designate all kinds of dark, basic, igneous rocks, especially those having the finer texture. Frequently certain granites are incorrectly classified as trap rock because of their dark color. The principal distinction between trap rock and granite lies in the difference of their chemical compositions: trap rock is a basic igneous rock and granite is an acid igneous rock.

At Trap Rock, Clingan, Monocacy, and Monocacy Hill the rocks were once in a fluid or molten condition and were forced up through fissures in other rocks to the positions they now occupy. They occur as dikes where they have solidified in vertical fissures, and as immense sills or lenses where they have been forced into and between the strata of horizontal sedimentary rocks.

The rocks are gray in color, of medium coarseness and belong to the species of trap rock known as gabbro. Throughout the immediate vicinity of the quarries the strata of sedimentary rocks have been dislocated, faulted, and upturned by the intruded igneous rocks and by the various movements which have later taken place. Being more resistant than the sedimentary rocks the trap gives rise, through erosion, to prominent topographic features.

In many places there is no overburden, especially on the tops of the several hills where large boulders of trap rock are at the surface; but, passing to the lower slopes, the overburden increases and red shale is usually found. This lack of overburden is due to the fact that trap rocks resist erosion.

The color varies in proportion to the amount of feldspar, hornblende, and other minerals present. The proportion of these minerals also determines the hardness of the rock.

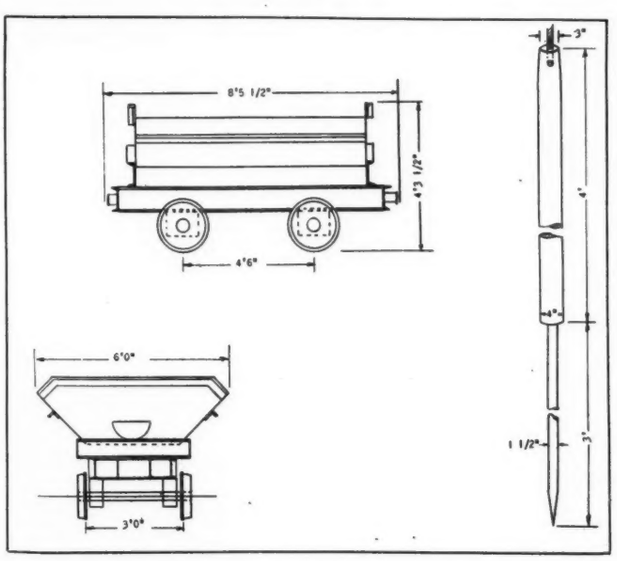

Fig. 2. Car used for stripping. Fig. 3 at right; block used for tamping charge in hole.

TABLE I. SUMMARY OF COSTS EXPRESSED IN UNITS OF LABOR, POWER AND SUPPLIES, 1929

Overburden, 16,202 cu. yd. (*weight per cu. yd., loose measure, 2,000 lb.*)
Production, 441,915 short tons (*weight per cu. yd., loose measure, 2,700 lb.*)

Operation	Stripping	Mining	Crushing	Other	Total
A. Labor:					
(Man-hours per ton stone)					
Drilling	.....	0.0384	.....	.....	0.0384
Blasting	.....	0.0023	.....	.....	0.0023
Loading	0.0155	0.0398	.....	0.0162	0.0715
Haulage	0.0072	0.0308	.....	0.0330	0.0710
Miscellaneous	.....	0.0368	0.0883	0.1323	0.2574
Supervision	0.0005	0.0254	0.0150	0.0237	0.0646
Total labor	$0.0232	$0.1735	$0.1033	$0.2052	$0.5052
Average tons per man per shift	431	57.6	96.8	48.7	20
Labor, percentage of total cost	.....	.....	.....	.....	31.13
B. Power Supplies:					
Explosives (lb. per ton)	.....	0.3112	.....	.....	0.3112
Total power (kw.-hr. per ton):					
1. Shovels	.....	.....	.....	.....	.....
2. Locomotives	.....	.....	.....	.....	.....
3. Air compression	.....	0.2420	.....	0.2160	0.4580
4. Drills	.....	0.0317	.....	.....	0.0317
5. Pumping	.....	.....	.....	.....	.....
6. Crushing	.....	.....	1.7782	.....	1.7782
7. Screening	.....	.....	0.1880	.....	0.1880
8. Elevating	.....	.....	0.0627	.....	0.0627
9. Conveying	.....	.....	0.0744	.....	0.0744
10. Sand	.....	.....	0.1029	.....	0.1029
11. Drying	.....	.....	.....	.....	.....
12. Storage	.....	.....	.....	.....	.....
13. Shops	.....	.....	.....	0.3211	.3211
14. Lighting	.....	.....	.....	0.0212	.0212
Fuel (tons of coal per ton)	0.007	0.035	.....	0.063	0.105
Other supplies in percentage of total supplies and power	.....	.....	.....	.....	43.71
Supplies and power, percentage of total costs	.....	.....	.....	.....	39.46
C. Percentage of total cost	.....	.....	.....	.....	$70.58

Throughout the deposit the presence of joints is pronounced. These joints are cracks or fissures which divide the mass into blocks, fitted together like masonry. The main system of joints roughly trend S. 40 deg. W. and are nearly vertical. At the Monocacy, Clingan, and Monocacy Hill quarries, these joints furnish excellent lines of parting and stand out as smooth vertical walls often extending 50 feet or more.

At the Birdsboro quarry this jointing is largely obliterated by the effect of slickensides. These slickensides are the result of compression which caused the rocks to move or slide upon each other and often crumbled the rock into smaller units. This accounts for the ease of fragmentation at this quarry. Throughout the quarry there are no well developed fissures or caves except in one place where a depression was caused by the erosion of a zone of weakness in the rock which was then filled with clay. This zone of weakness developed through the folding and crushing of the rock.

Other joints or faults are roughly at right angles to the main joints described and incline about 45 deg. northwest. This type of joint is not so well defined as the main system, but is fairly well marked in all the deposits.

This general trend of joints tends to make the rock break up in roughly rectangular blocks varying in size from dimensions of fractions of an inch to 5 ft. by 7 ft. An exception to this occurs in the center of the Clingan quarry, where jointing is poorly developed and fragmentation is slight so that the secondary drilling and blasting costs are increased.

The tonnage of unquarried rock available and the life of each plant have been estimated as follows:

Quarry	*Tons*	*Life in Years*
Birdsboro	101,500,000	440
Clingan	11,000,000	60
Monocacy	160,000,000	330

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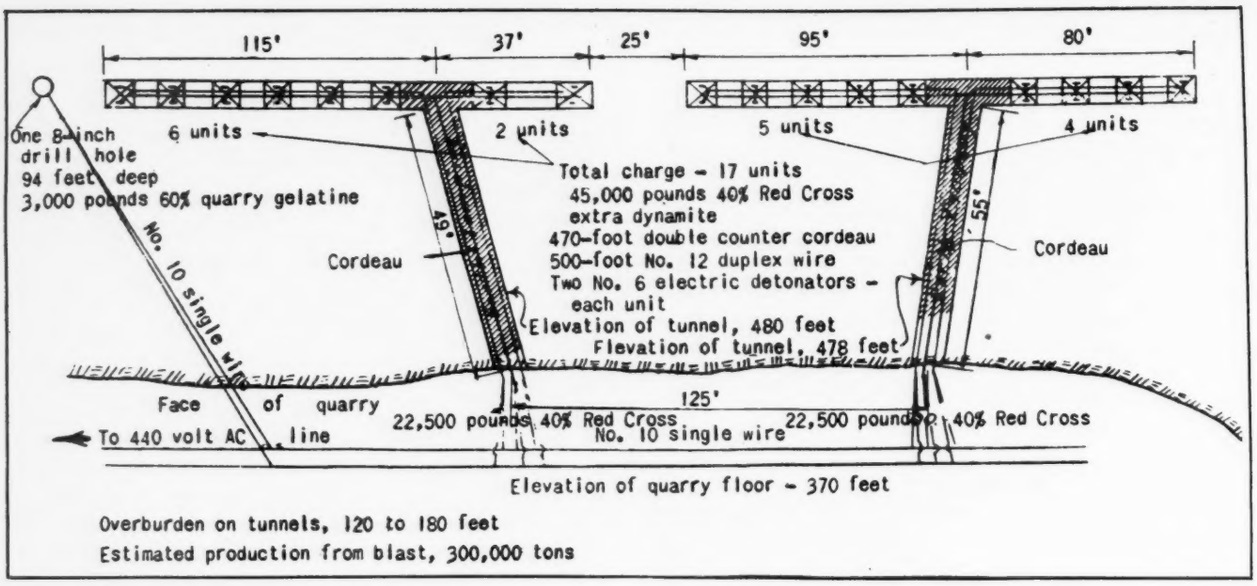


Fig. 4. Plan and loading of coyote tunnels and drill-hole shot on April 30, 1930.

A plan of the Monocacy quarry is shown in Fig. 1. The overburden averages about 5 ft. in depth. An Osgood 29 crawler shovel with a 1-cu. yd. bucket loads the dirt into rocker dump cars, each having a capacity of 2 tons. These are drawn by a 4-ton Plymouth gasoline, friction-drive locomotive upon 36-in.-gauge portable tracks. About 250 cu. yd. of dirt which has no value is removed daily and hauled to the dump about 1,000 ft. away. Since the job of stripping or removing overburden is intermittent, the crawler shovel performs many other tasks in and about the quarry and is, therefore, classed as service equipment—that is, equipment that does work for other departments. Details of the cars used in stripping are shown in Fig. 2. The stripping costs are shown in Table I.

TABLE II. DETAILED COSTS OF DRILLING AND BLASTING, 1929

Operation	Amount	Cost per Ton
Primary drilling—1,420 ft. well drill:		
Labor operating	$4,225.70	$0.0096
Power	746.05	0.0017
Labor repairs	2,073.26	0.0047
Material repairs	157.55	0.0004
Tools and miscellaneous supplies	386.21	0.0009
Shops	477.16	0.0010
Lubricants	28.12	0.0001
Supervision	24.30	0.0001
	$8,118.35	$0.0185
Primary blasting:		
Labor operating	81.38	0.0002
Explosives	9,191.83	0.0208
	$9,283.21	$0.0210
Summary:		
Total stripping costs	10,841.99	0.0245
Total drilling primary costs	8,118.35	0.0185
Total blasting primary costs	9,283.21	0.0210
Total cost rock on quarry floor	$28,243.55	$0.0640
Secondary drilling:		
Labor operating	4,108.14	0.0093
Air	7,199.45	0.0163
Operating supplies	90.38	0.0002
Repair labor	361.44	0.0008
Supervision	972.21	0.0022
Repair supplies	254.21	0.0006
	$12,985.83	$0.0294
Secondary blasting:		
Labor operating	1,808.13	0.0041
Explosives	8,852.57	0.0200
Supervision	44.19	0.0001
Other supplies	145.46	0.0003
	$10,850.35	$0.0245

Churn drilling is done by a Loomis Clipper and a Keystone drill, belt-driven by an 11-hp. Westinghouse slip-ring motor and a 15-hp. Allis Chalmers slip-ring ball-bearing motor, respectively; using 8-in. Carr bits of high-grade drill steel. The drilling speed is about 8 in. per hour. The holes are spaced 35 ft. apart and 40 ft. from the bench face. This spacing is necessary due to the columnar formation, the hardness of the rock, the height of the face (maximum being 310 ft. and minimum 225 ft.), the large number of holes shot simultaneously, and the fragmentation desired. The drills usually work from side to center, drilling holes 8 in. in diameter to a depth of 10 ft. below the level of the quarry floor.

Due to the height of the face and the type of joints, the drills have a tendency to follow these joints or cracks so that many holes are lost before reaching the desired depth. Therefore well drilling is very expensive.

To reduce this expense, tunneling or gopher drilling has been tried and, up to the time of this writing, it has been found successful. This type of drilling is done with Ingersoll-Rand drifter drills, which weigh 94 lb. mounted. Compressed air is delivered at a minimum pressure of 75 lb. per sq. in. at the drill. The average air consumption is 75 cu. ft. per minute per machine, including line loss, at peak load. One-inch hexagon, hollow drill-steel is used to drill the holes which are 1½ inches in diam. and 4½ ft. long. A two-man crew, working a 10-hr. shift, will advance from 20 to 25 ft. per week, mucking, drilling, and shooting in one shift. The method used is to make a five-hole burnout cut with 7 trim holes (Fig. 5). The holes are so arranged that the size of the tunnel will be 4 ft. wide and 5 ft. high, enabling loading and mucking to be done with ease. Drilling and blasting costs will be found in Table II.

Sixty-per cent 7-in. by 24-in. quarry gelatin, with

double-countered Cordeau, is used in blasting the well-drill holes. Springing is not practised, as the holes are drilled large enough to accommodate the powder to lift the toe. The Cordeau is lowered with the first cartridge of powder, the balance of the powder is dropped in the hole, and distance is measured after 10 cases have been loaded. Two crews, usually of powderman and helper, load the holes. Twenty cases of cartridges are loaded in 8 minutes. After the holes are loaded, dirt is poured in and left to settle.

If a hole becomes plugged while loading tamping blocks similar to those shown in Fig. 3 are used. These blocks were developed by the men at the plant after encountering difficulties in the use of others. Their superiority is that the pointed bottom section will punch through the clogged dynamite rather than drive it down by compression, while the shape and length of the upper section tend to force the blow near the center of the dynamite rather than against the walls. Also blocks of this shape are not so likely to damage Cordeau or to dislodge loose rock from the sides of the hole.

The routine of the work of loading a hole after the dynamite has arrived by railroad and our own locomotives have placed cars on the quarry floor is:

Unload freight cars and loading truck.
Truck to skip car.
Skip car to hole.
Bail water out of holes.
Lower Cordeau with first cartridge.
Drop balance of powder measuring every 10 cases.
Pour dirt in hole, leaving it to settle.

The fragmentation obtained is usually from a fraction of an inch to 60 by 84 inches, a minimum of secondary blasting being necessary because of the large primary crusher.

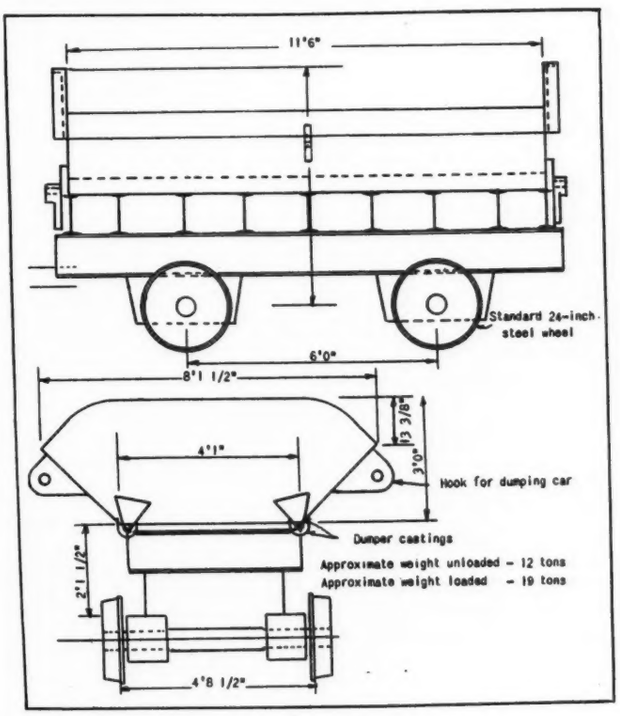
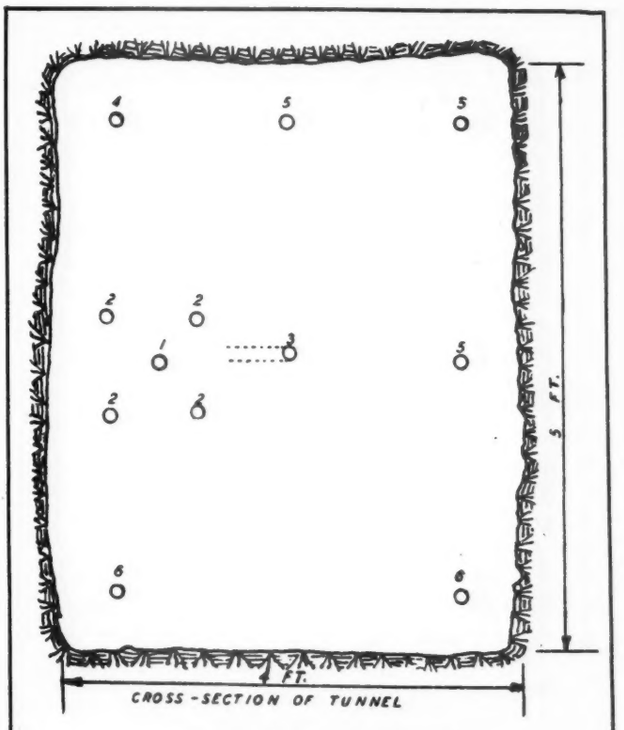


Fig. 6. Plan of the quarry cars.

On May 30, 1927, twenty-seven well-drill holes and one tunnel were shot simultaneously by means of 169,000 lb. of dynamite, bringing down 1,000,000 tons of rock at a cost of $0.0784 per ton. In the center of the quarry, where the face is 270 ft. high, trouble was experienced in reaching bottom so that, for four or five years, it was not blasted. In an endeavor to get this stone and straighten up the face, a tunnel was driven in this section to a depth of 108 ft. and three laterals were driven on each side. In addition, a line of well-drill holes was drilled on the left-side face with a few 100-ft. holes back of the tunnel to take care of the top breakage, to throw the top stone, and to make sure that the broken bank after the shot would not be dangerously high.

The results obtained with this shot were so satisfactory that it was decided to continue with the tunnel method of blasting. Well drilling has been discontinued and, where the face exceeds 200 ft., two level tunnels are driven to give a burden over each tunnel of 100 ft. or more.

On April 30, 1929, two top-level tunnels were fired. The tunnel portals were started 120 ft. above the quarry floor and were driven level. At the west end where a considerable end break was to be expected, a 93-ft. well was drilled to give better breakage in this section and was loaded with 2,500 lb. of 60-per cent quarry gelatin. This, added to the load



Hole No.	Order of firing
1	Unloaded
2	First
3	Second
4	Third
5	Fourth
6	Fifth

Fig. 5. Drill-hole layout in coyote tunnels; all holes are 4½ ft. deep.

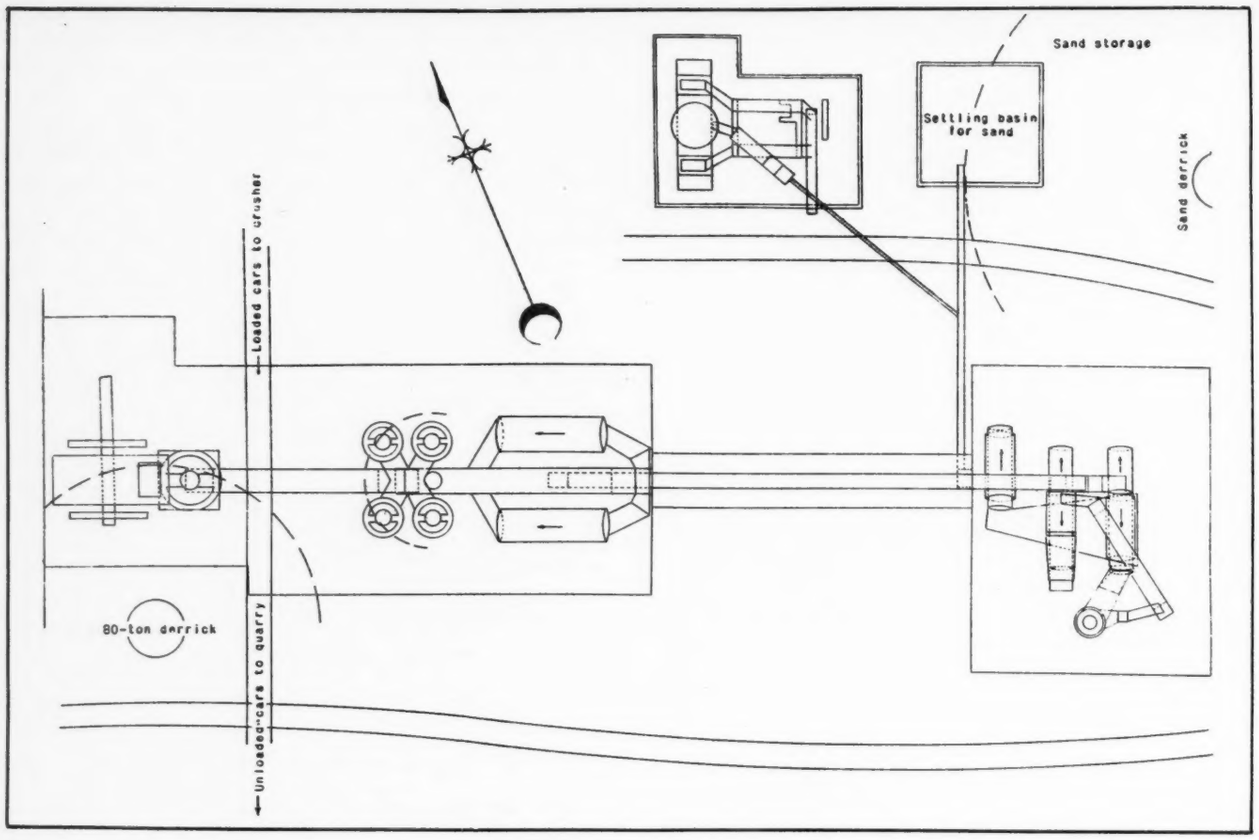


Fig. 7. Plan of crushing plant.

in the tunnels, made a total load of 44,500 lb. The main tunnel load was 40-per cent Red Cross Extra dynamite. The plan and loading of the coyote tunnels and the drill holes shot on April 30, 1930, are shown in Fig. 4.

The problem of supplying the powder and stemming to the tunnels was solved by the use of the Osgood 29 shovel which was fitted with a crane boom and mounted on the top ledge of the quarry. The dynamite in the original boxes was lowered to the tunnel portals, where the boxes were opened and the 5-in. by 16-in. cartridges stacked in wheelbarrows and wheeled over a board flooring into the tunnel. In this manner approximately 200 lb. to 350 lb. of dynamite was taken in at a time and piled like cordwood in the unit for which it was intended.

No. 12 waterproof duplex leading wire was strung in each tunnel, and a separate circuit was made for each wing. This was supported at 12-ft. intervals by screw eyes in the roof. The screw eyes were placed in bolt expanders driven into drilled holes in the roof. Two No. 6 electric detonators were placed in each unit and connected in parallel with the wing tunnel circuit. As an additional precaution, a line of Cordeau was run to the portal of the main entry and another line of Cordeau was used to connect the last unit of each wing with the last unit of the opposite wing.

Single No. 10 leading wire was used to connect both tunnels and the well-drill holes in parallel, and the shot was fired from a 440-volt a.c. line.

No stemming was used between the wing units but, at the junction of the main tunnel and the last wing unit, powder boxes filled with dirt were piled to the roof to act as a bulkhead and the balance of the tunnel was filled to the portal with dirt. The use of dirt as stemming in this shot is in sharp contrast with the use of water in the tunnel shot on May 30, 1927. This tunnel blast was successful, as it brought down 250,000 tons of rock at a cost per ton of $0.0336 as compared with $0.0784 per ton, the cost of the shot on May 30, 1927.

Twenty-five to thirty per cent of the rock on the quarry floor exceeds a size of 60 in. by 84 in. and therefore requires secondary blasting. Mud capping or block-holing are the methods used in secondary blasting. The size and shape of the boulder govern the position of the holes. The quantity of explosives used in secondary and primary blasting averages about the same, each costing $0.02 per ton. Charter Oak fuse, with a burning speed of 1 ft. per min., is employed.

Two steam, railway-type, Marion Osgood 120 and Bucyrus 950 shovels mounted on traction wheels and equipped with 4-cu. yd. dippers, are used in loading rock. The idea of traction wheels on a railway shovel for use in quarry work was developed at this quarry, the advantages being that the greater flexibility of the shovel gives approximately 50 per cent more capacity by speeding up the work and that four laborers are eliminated on each shovel. These shovels are each operated by three men—an

engineer, a craneman and a fireman—and a utility man acts as pitman on the shovels and as a powderman's helper when secondary blasting is being done. These shovels will load eight cars of 9-tons capacity in five minutes, averaging about 2,000 tons of rock per day each.

The transportation from the quarry floor is taken care of by four H. K. Porter 18-ton, saddle-tank, steam locomotives with 4-wheel drive of standard gauge. These locomotives each draw 3, 4, or 5 all-steel cars with flat bottoms and sloping sides, of 10-tons capacity, up a grade of 1½ per cent to the crusher and down a grade of 4 per cent from the crusher. The cars were designed and built at the plant. The distance from the quarry face to the crusher is about 1,000 ft. Where the tracks are permanent, 85-lb. rails are used, and where they are temporary, 70-lb. rails are used. The locomotives make a complete circle through spring switches that do away with the need of a brakeman and switchman. Each engineer operates the locomotives, fires, takes water, and lubricates his cars. The fuel used for the locomotives is a high volatile coal which is delivered on the quarry floor by the shipping locomotive and unloaded by a crane. Details of the quarry cars are shown in Fig. 6.

The quarry has a natural drainage. The surface water flows out from the quarry face to a stream 30 ft. below the floor.

A plan and elevation of the crushing plant are shown in Figs. 7 and 8. An electric hoist, built at the plant, driven by a G. E. 25-hp. squirrel-cage motor, dumps the stone from the quarry cars into the primary crusher. The arrangement for unloading cars is shown in Fig. 9. The flow sheet of the plant is shown in Fig. 10.

The stone after leaving the quarry cars flows through the following equipment:

60-in. by 84-in. Blake crusher.
30-in. Superior McCully gyratory crusher.
54-in. conveyor belt.
60-in. elevator bucket.
Grizzlies.
Two 84-in. scalping screens.
Four 16-in. special crushers.
36-in. conveyor belt.
Discharge split feed to vibrating screen and 60-in. by 16-ft. screen.
Washing.
60-in. by 24-ft. sizing screens.
48-in. by 16-ft. revolving screens.
Symons 4-ft. cone crusher.
Elevator vertical.
Chaser mill.

The primary breaker is a 60-in. by 84-in. Blake jaw crusher, manufactured by the Power & Mining Engineering Co., with an opening of 11 in. at the discharge. This machine has been rebuilt at the plant to meet the special requirements necessary in the crushing of hard rock. It is driven from an extension shaft, one end of which is connected through a flexible coupling to a G. E. 500-hp. slip-

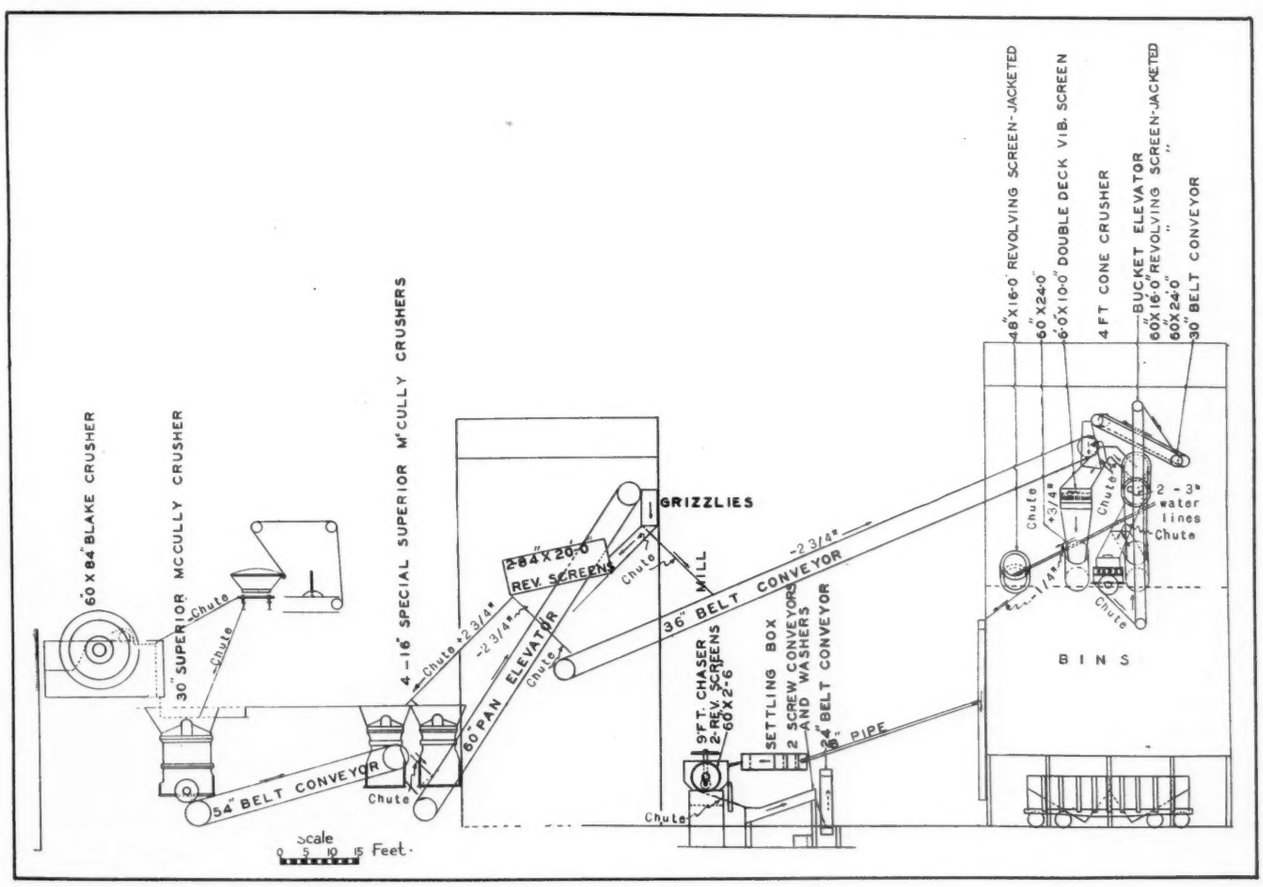


Fig. 8. Elevation drawing of the crushing plant.

ring, variable-speed motor and the other end through a similar coupling to a G. E. 500-hp. low-starting-torque synchronous motor.

The induction motor is for starting and emergency. In starting when the extension shaft has reached synchronous speed, the synchronous motor is thrown in and the induction motor is cut out. Thus, under running conditions, the induction motor is idling on the line. The use of the 500-hp. synchronous motor is necessary to improve the power factor and provide sufficient power to meet peak loads. The 30-in. Superior McCully gyratory crusher also receives its power from this source by belt drive. It is manganese-fitted throughout and has a spider which was specially designed at the plant. The feed to this crusher is by gravity and is directly underneath the primary jaw crusher. The discharge end has an opening averaging about 4½ in. from which the stone is discharged onto a 54-in. conveyor belt.

Stone averaging in size from a fraction of an inch to approximately 5 in. is carried to the 60-in. elevator by a 54-in. rubber conveyor belt 88 ft. long, driven direct by a G. E. 25-hp. squirrel-cage motor on a speed reducer, having an hourly capacity of about 600 tons.

Power is transmitted to the 60-mesh elevator by a G. E. 150-hp. induction motor through a chain drive and spur-gear reduction. The elevator inclines about 70 deg., is 74 ft. center to center, equipped with 83 buckets, and carries the stone from the 54-in. conveyor belt to the two grizzlies. This elevator, which also was designed at the plant, has double the capacity of the previous elevators and has cut the speed down about 40 per cent.

The scalping screens are relieved of some of the fines by two grizzlies placed at the head of the 60-in. elevator and made of perforated plates having round holes of 2¾ in.

The two 84-in. scalping screens are 20 ft. long and are driven by a G. E. 75-hp. motor through a silent-chain drive. These screens have been built from patterns and drawings made at the plant and consist of four sections; the first three sections have 3-in. round openings and the last section a 3½-in. square opening.

Four special Superior McCully crushers, each driven by an Ideal 150-hp. motor direct-connected with flexible couplings, receive the stone which is rejected on the two 84-in. scalping screens, reducing the size to 1¾ in., which is the discharge setting of the crusher. The discharge from the 16-in. crushers is returned to the 60-in. elevator and thence to the 84-in. scalping screens, thus forming a closed circuit.

The minus from the scalping screens is delivered to a 36-in. rubber conveyor belt and carried for a distance of 100 ft. to the screening and bin building. This conveyor, 110 ft. long, inclines 22 deg. and is driven from a line shaft in the screen building by the motor which also drives the two revolving screens.

Stone is delivered by a split feed to a 60-in. by 16-ft. Allis-Chalmers revolving screen and to a Niagara

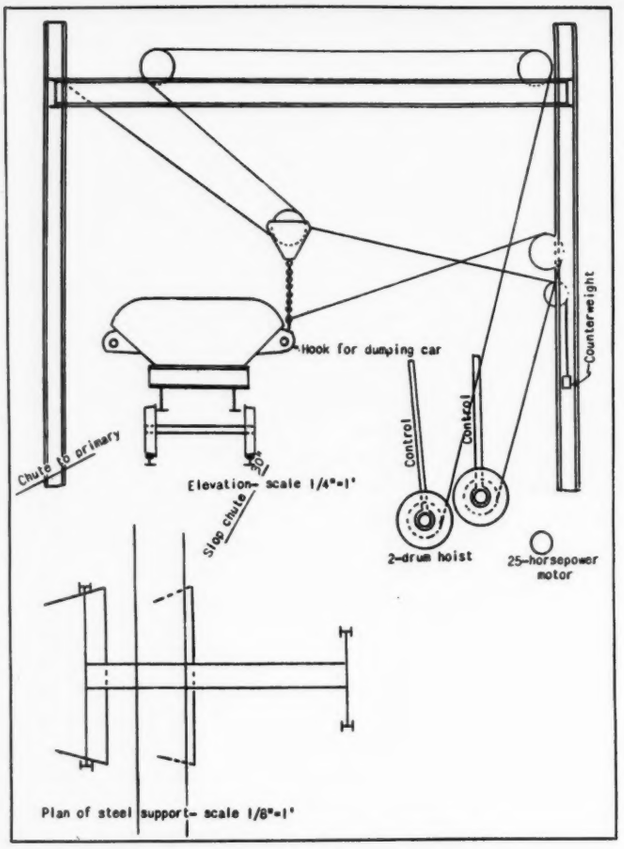


Fig. 9. Arrangement of car unloader.

6-ft. by 10-ft. heavy-duty, double-deck vibrating screen.

The 60-in. by 16-ft. screen is equipped with round perforations of 1¼ in. for the full length and jacketed with perforations of ⅞ in. This screen and the two 60-in. by 24-ft. screens are driven from line shafts by two G. E. 75-hp. motors. The rejects from this screen are delivered to the 60-in. by 24-ft. revolving screen. The rejects from the outer jacket are delivered to the commercial ¾-in. bins. The minus from the outer jacket is delivered to the 48-in. by 16-ft. screen.

The vibrating screen is equipped with wire cloth openings on the top deck of 1⅛ in. and $^{11}/_{16}$ in. on the bottom deck, and is driven by a G. E. 7½-hp. motor. The rejects from the upper deck are delivered to the 60-in. by 24-ft. revolving screen. The rejects from the lower deck are delivered to the commercial ¾-in. bin. The minus from the lower deck is delivered to the 48-in. by 16-ft. screen.

After the stone leaves the 36-in. conveyor belt and is received by the above screens, the stone is washed by the spray method. The water is received by gravity, through pipes which are 10 in. in diameter at the reservoir on top of the quarry and 5 in. in diameter at the crusher.

Rejects from the 60-in. by 16-ft. revolving screen and the 6-ft. by 10-ft. vibrating screen are delivered by gravity on steel chutes to two Allis-Chalmers rebuilt 60-in. by 24-ft. screens. Each of these screens is equipped with six sections, three of which have round perforations of 1¼ in., while the other

three have round perforations of 1¾ in. They are driven from line shafts by the two G. E. 75-hp. motors which also furnish the power for the 60-in. by 16-ft. screen. The rejects from these screens are emptied into the ballast bins.

The minus stone from the vibrating screen and the 60-in. by 16-ft. revolving screen is delivered by gravity to a 48-in. by 16-ft. revolving jacketed screen which has ½-in. round perforations on the inside and ¼-in.-round perforations on the outside. The two G. E. 75-hp. motors also supply the power for this screen. The minus ¼-in. stone and the water which passes through are led outside the bin building by a sluice and discharged into a 20-ft. by 20-ft. concrete pit. The overflow from this pit, consisting of water and stone dust, passes to a stream and the sediment in the pit is picked out by a clamshell bucket and placed on the sand storage pile, on

TABLE III. DETAILED AVERAGE COSTS OF HAULAGE, CRUSHING, WASHING, SCREENING AND STORAGE, 1929

Operation	Amount	Cost per Ton
Haulage to crusher:		
Labor operating	$4,235.06	$0.0096
Fuel	2,842.97	0.0064
Labor repairs—rolling stock	3,214.15	0.0073
Materia1 repairs—rolling stock	936.73	0.0021
Labor m aintenance of way	2,177.68	0.0049
Material maintenance of way	407.65	0.0009
Miscellaneous supplies	411.26	0.0009
Lubricants	89.39	0.0002
Shop repairs	883.08	0.0020
Supervisor	1,502.51	0.0034
Coal crane expense	357.01	0.0008
	$17,057.49	$0.0385
Crushing, washing, and screening:		
Labor operating	8,015.05	0.0180
Power	23,769.50	0.0537
Labor repairs	13,340.76	0.0302
Material repairs	16,723.38	0.0378
Tools and miscellaneous supplies	1,392.24	0.0031
Lubricants	1,811.85	0.0041
Water rights	300.00	0.0007
Shops	3,404.78	0.0077
Supervision	4,772.68	0.0108
	$73,530.24	$0.1661
Sand storage:		
Labor operating	979.75	0.0022
Power	1,193.87	0.0027
Labor repairs	1,158.97	0.0026
Material repairs	304.50	0.0007
Tools and miscellaneous supplies	204.23	0.0005
Shops	365.76	0.0008
Supervision	366.01	0.0008
	$4,573.09	$0.0103

cars for shipment, or sent to the chaser mill for further reduction.

The 4-ft. Symons cone crusher is an auxiliary crusher and is set at the discharge end of the 60-in. by 16-ft. revolving screen. When the demand is large for small sizes, the rejects from the 60-in. by 16-ft. screen, instead of going to the 60-in. by 24-ft. screens, are diverted by a steel chute to the 4-ft. cone crusher. After passing through this crusher the stone is lifted by a vertical elevator to the 6-ft. by 10-ft. vibrating screen, from which it passes over the same screens as previously explained. A Westinghouse 200-hp. synchronous motor furnishes the power for this crusher, but the plant is charged with a rating of only 100 hp. by the electric company from which the power is purchased. Table III gives average crushing costs, as well as data on haulage, washing, screening, etc.

A continuous bucket elevator, manufactured by the Chain Belt Co., with a capacity of 150 tons per hour and driven by a G. E. 25-hp. motor, carries the stone from the 4-foot cone to a short conveyor which discharges to the 6-ft. by 10-ft. vibrating screen. This bucket elevator has a capacity of 150 tons.

At present a 9-ft. chaser mill, wet type, manufactured by the Lewistown Foundry & Machine Co., is being installed. This mill will be belt-driven by a G. E. 30-hp. squirrel-cage motor and is expected to produce 125 tons daily through 30-mesh.

In nearly every case, the motors are larger than required to drive the machinery at normal load and are larger than manufacturers of equipment ordinarily recommend. This is because the stone is extremely hard, thereby causing the peak load to exceed the average load. Maintenance costs have been reduced considerably by the use of larger motors to drive the equipment.

It will be noted that this plant supplies the demand for stone, though it makes only five sizes totaling 450,000 to 500,000 tons yearly. The five sizes are as follows:

1. Ballast through 3-in. retained on 1¾-in.
2. 1½-in.—through 1¾-in. retained on 1¼-in.
3. ¾-in.—through 1¼-in. retained on ⅞-in.
4. ½-in.—through ⅞-in. retained on ½-in.
5. ¼-in.—through ½-in. retained on ¼-in.

(Minus-¼-in. sand is not included in production figures since, previous to this writing, all the sand produced had not been sold.)

The perforations of the screens may be changed from time to time, depending upon the size demanded.

The flexibility of the plant in supplying the demand for stone may be seen from the following maximum and minimum percentages of stone produced, which have been taken from the monthly production covering a period of four years.

Size	*Maximum Per Cent*	*Minimum Per Cent*
Ballast	61	20
1½-in.	37	5
¾-in.	67	10
½-in.	56	7
¼-in.	8	1

The placing and removing of equipment in the crusher hoist is done by a stiff-leg derrick of 75-tons capacity, having a 40-ft. mast and a 55-ft. boom, with three blocks and wire cable (made by the Terry Manufacturing Co.) operated by a triple-friction drum, 18-in. by 30-in. hoisting engine (manufactured by the National Hoisting Engine Co.) connected to a G. E. 75-hp. induction motor.

A 10-ton derrick building mounted with a 50-ft. boom, manufactured by the Terry Manufacturing Co., driven by an Allis-Chalmers 40-hp. motor, handles the scalping and secondary machinery.

The sand is removed from the concrete pit to cars or to storage pile by an American hoist derrick with a 1-cu. yd. clamshell bucket driven by a G. E. 40-hp. motor.

The crusher building is a steel-frame structure with double-pitched roof and concrete foundations. It covers a ground area of 5,087 sq. ft., and has a volume of 229,932 cu. ft.

The bin-and-screen house also is a steel-frame structure having H columns, on concrete as foundation, and covers a ground area of 3,143 sq. ft., and has a volume of 267,155 cu. ft.

The bins are arranged in such a manner that their contents may be drawn off through gates. One man can load two separate sizes into two railways cars as each bin has its own individual track.

The storage yard, with a capacity of 300,000 tons, and the Pennsylvania Railroad are about 2.2 miles away from the screening and bin house. To handle this transportation problem the plant has two steam locomotives, one a 70-ton, 6-wheel standard gauge, the other a 40-ton saddle tank, 4-wheel standard gauge; three Western 30-ton all-steel, vertical-cylinder, air-dump cars; six steel hopper cars with a capacity of 50 tons; and a track of about 13,000 ft., of 85-lb. and 100-lb. rails. These tracks are so laid that all parts of the plant are reached, coal for use of shovels in quarry, and explosives for primary blasts are delivered direct to the quarry floor, riprap is loaded direct into railroad cars on the quarry floor, and service equipment such as the Browning locomotive crane and the electric welder, which is mounted on a standard-gauge car, can reach all parts of the plant.

Stone for storage is loaded from the bins into hopper cars which, upon arriving at the storage yard, are emptied into one of the five concrete pockets provided for the purpose. These pockets have a depth of 20 ft., are 30 ft. square, and lie to the side of the tracks which are necessary for the operation of the 16-ft.-gauge crane. A plan of the storage yard is shown in Fig. 11. Costs of storage and shipping are given in Table IV.

Cranes

The Orton and Steinbrenner 16-ft-gauge locomotive crane having a bucket of 3-cu. yd. capacity, with its road bed between the concrete pockets and the piles of stone, removes the stone from the pockets and throws it on its respective pile. Forty cars, each with a capacity of 50 tons, may be loaded daily by this crane.

In loading stone from storage the 16-ft. crane is assisted by a Browning locomotive crane of standard gauge with a bucket of 1½-cu. yd. capacity. Ten cars of 50-tons capacity may be loaded daily by this crane. Besides loading stone it aids in the clearing up of stone piles, as it can reach the stone which flows out of the reach of the 16-ft. crane. The Browning crane is classed as service equipment, since it performs work for other departments throughout the year.

At present the handling of stone at the storage yard is undergoing a change. In the future the storage problem will be handled by a Brownhoist 15-ton, 30-ft.-gauge, electric portable crane which will have a 5-cu. yd. bucket. The tracks for this crane will extend for about 800 ft. and will span the concrete pockets with the loading and unloading tracks for the railroad lying to one side of the pits. The piles of stone on both sides of the crane will be easily reached by means of its 100-ft. boom. It is expected that the shipping capacity of the plant will be increased 100 cars per day upon the completion of the work now in progress.

Power for the crane will be furnished through three single-rail conductors mounted on a 4-ft. concrete wall and connected with contact shoes to the crane. The 4-ft. concrete wall also acts as a retaining wall, thus increasing the storage capacity of the yard.

The crane will have the following electrical equipment:

2 G. E. 100-hp. slip-ring, variable-speed, hoist motors operated with magnetic controls, dynamic and oil brakes; dynamic brake checks load. Oil brake holds load.

1 G. E. 52-hp. slip-ring, rotary motor, magnetic controls; rotating.

1 G. E. 52-hp. slip-ring, travel motor, Drimi-type control.

1 G. E. 52-hp. slip-ring, boom hoist motor, Drimi-type control; magnetic brake.

The installation of this crane and the laying of the foundation are being done by the regular employees of the plant.

Another new addition which will take care of stone to be hauled by customers' trucks is a steel

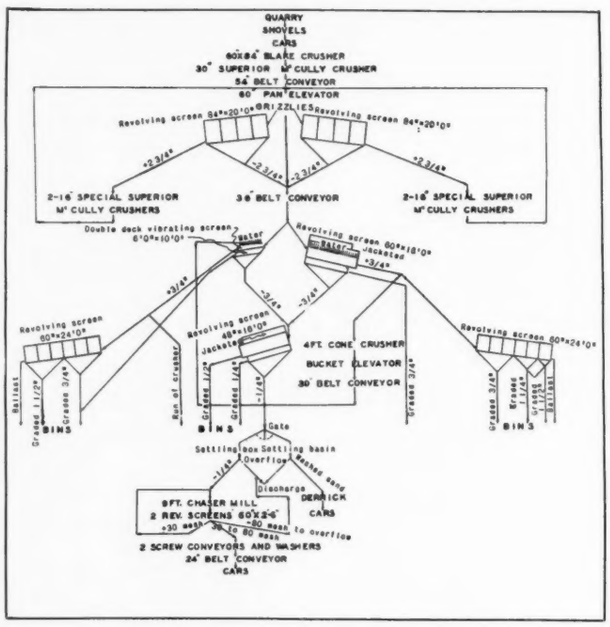


Fig. 10. Flow-sheet of plant.

trestle equipped with eight 75-ton hoppers which will enable 24 trucks to be loaded at one time. This trestle was fabricated and erected by the men regularly employed at the plant.

The stone is weighed on a 150-ton-capacity scale, manufactured by the Standard Scale Co., by the shipping clerk who receives shipping instructions by telephone from the main office at Norristown, Pa., confirmed on the following day by mail.

The expense of other equipment and facilities of the plant may be divided into two classes, service and general plant expense.

The service class includes air compression, machine, blacksmith, welding, Browning locomotive crane and caterpillar shovel, while the general plant expense consists of superintendence, general yard, hotel, quarry dwellings, truck, and miscellaneous buildings costs.

The difference between these departments is that the service departments perform work for other departments, the costs of which can be distributed on the basis of man-hours or shovel-hours, while the departments composing the general-plant-expense class also assist the other departments, but the costs can not be allocated on any such basis.

Air is used for tunnel and secondary drilling, drill sharpening, and general repairs. A PRE-2 air compressor of 1,302 cu. ft. capacity, driven by a 210-hp. synchronous motor, furnishes the main source of air. In addition to this there is a 14-in. by 12-in. Er-1-JR. air compressor, located on top of the quarry, which is used for stripping purposes, and a 9-in. by 8-in. Type 20 portable compressor which furnishes the air for scattered jobs throughout the plant. In cases of breakdown, when a few men work overtime to repair, this latter compression is indispensable.

It will be noted that nearly all of the equipment has been rebuilt and redesigned at the plant and that many new additions in equipment are being erected by the regularly employed men at the plant. To do this it is necessary to have a well-equipped shop and to employ mechanics who understand the requirements and rough usage to which equipment is put in quarry work. When new equipment is purchased it is watched carefully to observe the possible weak spots so that they can be reinforced. Each part of a machine is investigated to determine whether repairs could be made more economically by the shops or by outsiders. Patterns are made of some of the cast parts in order to save time when a replacement is necessary. At the present time 725 patterns of this sort are on hand, some of which have been made at the shops. These shops do work for the two other quarries belonging to the company, located nearby.

Castings of pinions, car axles, wheels, pistons and piston rings, well-drill stems, shafting, and motor bearings are ordered in the rough and are machined to meet the requirements of the particular job. Bolts from $\frac{5}{8}$ in. to $3\frac{1}{2}$ in. in diameter are made and threaded. Drill steel is purchased in mill lengths, and drills of various lengths are cut. Switch points, guard rails, crossovers, and frogs for the plant's railroads are fabricated. All quarry cars are rebuilt.

Practically all necessary welding work is done in the shops at considerable saving of time and money. Some examples of the work done follow:

Shaft on a 60-in. by 84-in. primary crusher wore down to about 1 in. below size. The welders built the metal back to size. Worn spiders on gyratory crushers have been built up, thereby saving a replacement. A cylinder on a locomotive was rewelded and bored. Crusher frames have been welded and rebored.

The personnel of these shops is four machinists, two blacksmiths and three welders.

The overhead costs of the various jobs performed by these departments are distributed on the basis of man-hours. All labor and material are charged directly to the job.

Electric power is purchased through the Associated Gas and Electric Co., and all parts of the plant are reached by the power lines. The kilowatt-hours consumed are spread over the various departments, except crushing and screening, on the basis of the rated horsepower, taking into consideration the number of hours each motor is operated during the month and charging the balance to crushing and screening. These figures are checked, from time to time, by placing a meter on each department, the electrician's time being charged direct to the job upon which he and his helpers are working.

Since the Browning locomotive crane and caterpillar shovel have been previously explained nothing need be said at this point other than that the costs of operating are distributed over the various jobs upon which they work on the basis of crane- or shovel-hours. Depreciation is included.

Superintendence includes the salary of the superintendent, quarry clerk, all costs in connection with the safety program, and engineering. The general yard expense includes the costs of keeping the plant clean as a whole and any costs which can not be definitely allocated to a particular job. The hotel or boarding house provides the men who desire it with their dinner at a cost to them of 35c. per meal, the company shouldering the balance of the costs. This scheme has repaid the company in more ways than one, as it provides a place for the men to meet and eat, thereby bringing about good fellowship. The men can get a hot meal in inclement weather and, in cases of overtime due to breakdowns, the men are willing to work late knowing that they can secure a hot meal at the company's expense. The hotel provides food for the company's annual outings when the three plants vie with one another for supremacy in athletic events.

In the vicinity of this plant are 27 dwellings, owned by the company and rented to the employees at a nominal cost, the excess costs being absorbed

TABLE IV. DETAILED AVERAGE COSTS OF SHIPPING 426,725 TONS OF CRUSHED STONE, 1929

Operation	Amount	Cost per Ton
Railroad—direct shipments: or ground storage:		
Labor operating	$4,383.93	$0.0103
Fuel	6,248.65	0.0146
Labor repairs—rolling stock	3,598.06	0.0084
Material repairs—rolling stock	246.28	0.0006
Labor maintenance of way	1,670.91	0.0039
Material maintenance of way	236.91	0.0006
Tools and miscellaneous supplies	247.25	0.0007
Lubricants	105.53	0.0002
Shops	1,107.08	0.0026
Crane expense, coal	128.80	0.0003
Supervision	1,450.87	0.0034
	$19,424.27	$0.0456
Scale house:		
Labor operating	6,792.07	0.0159
Labor repairs	123.60	0.0003
Material repairs	2.39	.....
Miscellaneous supplies	241.41	0.0006
	$7,159.47	$0.0168
Ground storage:		
Labor other than 16-ft. crane	2,653.53	0.0062
16-ft. gauge crane:		
Labor operating	1,609.97	0.0038
Fuel	2,324.34	0.0054
Labor repairs	1,074.20	0.0025
Material repairs	596.34	0.0014
Tools and miscellaneous supplies	2,070.83	0.0049
Lubricants	93.52	0.0002
Shops	449.19	0.0011
Supervision	1,578.88	0.0037
	$9,797.27	$0.0230
Browning locomotive crane (service)	4,507.53	0.0102
Total shipping expense	$43,542.07	$0.1018

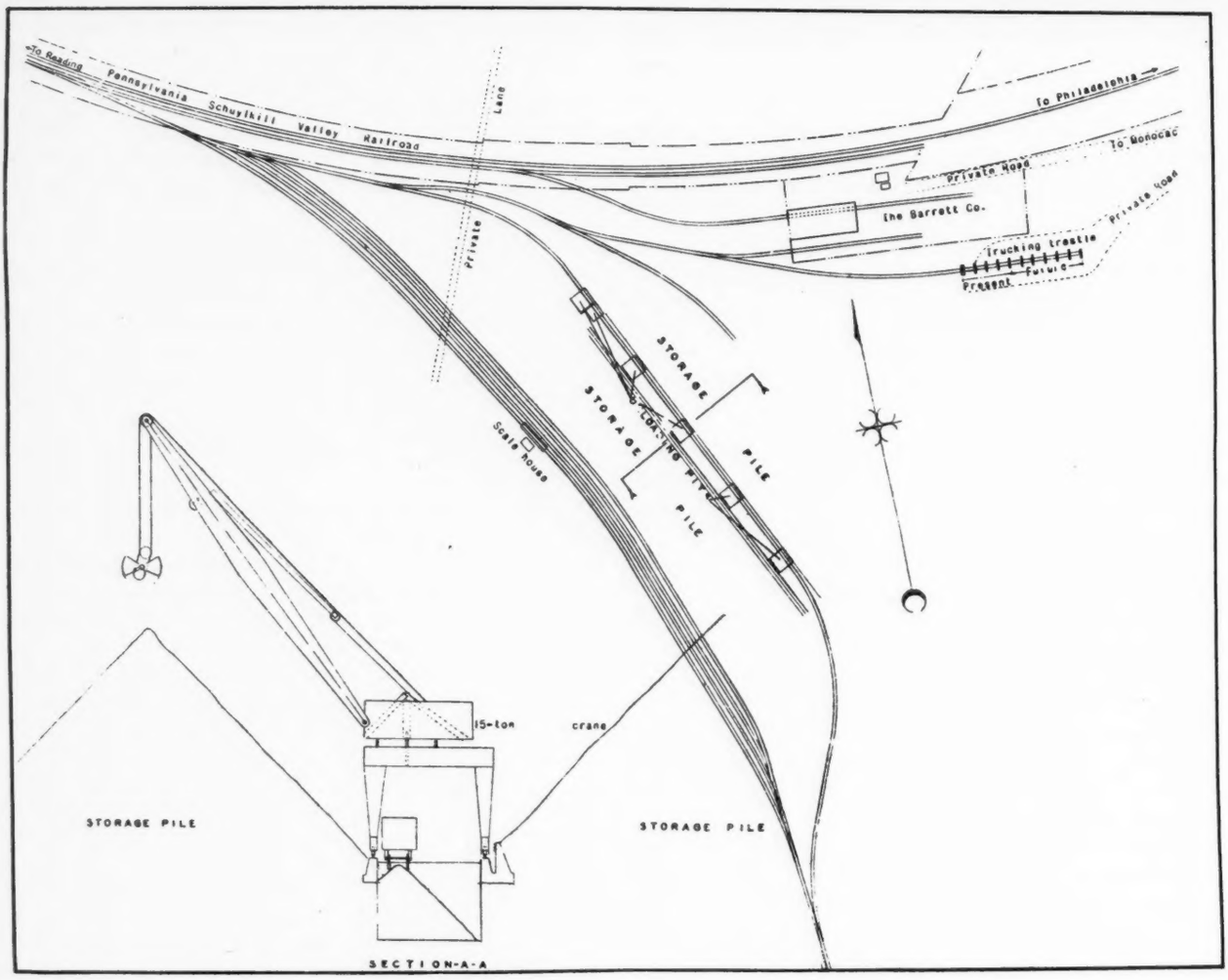


Fig. 11. Plan of the storage yard.

by the company. A Reo truck hauls the freight for the plant, carries the men to and from work, and does odd jobs in and about the plant. The buildings grouped as miscellaneous are those in which material, spare parts, and patterns are stored.

After an employee has been with the company six months he is eligible for both group and health insurance without taking a physical examination. The premiums on the group insurance are paid by the company, the amount of the insurance starting with $500 and increasing $100 every year the employee is with the company until the maximum of $5,000 is reached. The premiums on health insurance are paid by the employees themselves. An amount of $1 per month entitles them to $13 per week sick benefits for 13 weeks after the first three days' sickness.

All supplies except coal, explosives, and gasoline are charged direct to the department for which the supplies are to be used. The quarry clerks, upon ordering such material, insert on the requisition the accounts to which the material is to be charged. Coal, explosives, and gasoline are inventoried, and the quarry clerk reports, at the end of each month, the amount received during the month, the quantity used during the month, where used, and the balance on hand.

In addition, an inventory report is sent to the main office showing tons of rock shot down during the month, tons of rock removed from the quarry floor during the month, tons of rock remaining on the quarry floor, holes drilled and used during the month, the balance on hand at the end of the month, tons of stone placed in and taken out of storage during the month, and balance of crushed stone on hand at the end of the month. A stripping report also is rendered at the end of each month.

To insure regular deliveries of coal, a standing order is usually placed with the vendor to deliver a certain number of cars weekly. This order is changed from time to time according to the demands of the plant.

Communication between the different departments is by telephones which are conveniently placed in the quarry office, scale house, machine shop, and hotel. In cases of breakdowns in departments where there are no telephones, communication between departments is made by means of signals.

The ratio of stone sold to stone broken from the

TABLE V. SUMMARY OF DETAILED AVERAGE COSTS—DIRECT OPERATION, MONOCACY QUARRY, 1929

Operation	Amount	Cost per Ton
Stripping costs	$10,841.99	$0.0245
Primary drilling	8,118.35	0.0185
Primary blasting	9,283.21	0.0210
Total cost of rock on quarry floor	$28,243.55	$0.0640
Secondary drilling and blasting	23,836.18	0.0539
Loading to crusher	34,322.84	0.0777
Hauling to crusher	17,057.49	0.0385
Crushing, washing and screening	73,530.24	0.1661
Sand	4,573.09	0.0103
Miscellaneous plant	26,912.62	0.0609
Total cost at crusher	$208,476.01	$0.4714
Shipping expense:		
Railroad, direct or storage	19,424.27	0.0456
Scale house	7,159.47	0.0168
Ground storage	16,958.33	0.0394
Total shipping expense	43,542.07	0.1018
Total operating costs	$252,018.08	$0.5732

NOTE: Cost per ton units are based on production (441,915 tons) up to and including "total cost at crusher." Cost per ton units are based on shipments (426,725 tons) including "total shipping expense."

solid is about 98 per cent; 2 per cent being lost through washing. All the stone is sold as crushed stone except, in a few isolated cases, when one- and two-man stone is sold.

All the employees are paid on an hourly basis except well drillers, the superintendent, quarry clerks, and the night watchman. Well drillers are paid an hourly rate with a bonus of 25 c. per ft. for all footage drilled in excess of 100 ft. per month.

During 1929, this plant operated 283 days, averaging 55 hr. per week and making a total of 223,240 man-hours. The average hourly wage was 54¾ c. Table V contains an interesting summary of all costs at the plant.

In the preparation of this paper the author received the invaluable assistance of many of his co-

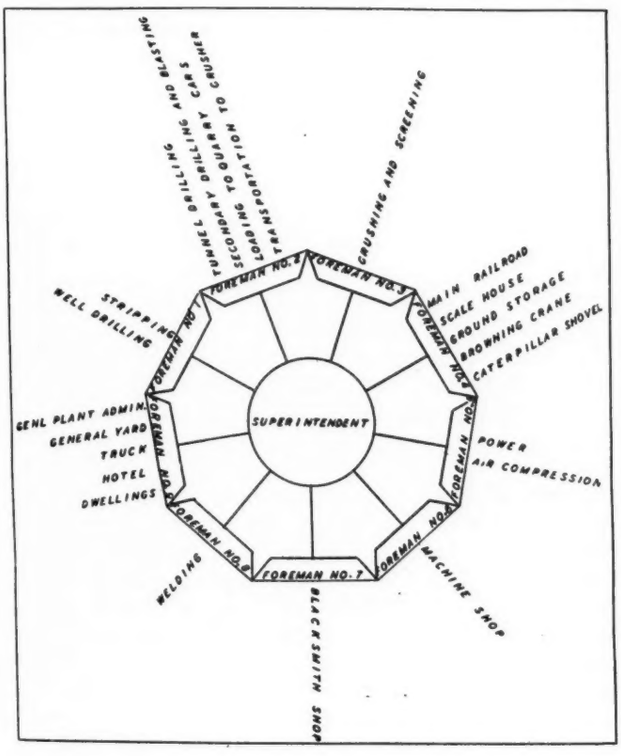


Fig. 12. Chart of quarry organization.

workers. Especial acknowledgment is made to F. T. Gucker, president of the company, through whom the writing of this paper was made possible; William A. Kelly, superintendent of the quarry; and Henry A. Rowan, 3rd, safety engineer. W. B. Prichett and Thomas McPoyle, engineers, furnished the drawings. The author also expresses his gratitude to Prof. F. E. Williams, of the University of Pennsylvania, for the information regarding the geology of the quarry, and to John C. Koster, of the E. I. Du Pont DeNemours Co., from whose article on the tunnel blasting much information was taken.

Bureau of Mines Reports Production of Sand and Gravel in 1929

Both the quantity and value of sand and gravel reported by producers in the United States for 1929 showed gains over any preceding year, according to statistics just made available by the U. S. Bureau of Mines. The total production for 1929 is reported at 222,571,905 short tons, a gain of 6.4 per cent over the preceding year. A decline in the production of structural sand and gravel in comparison with 1928 was apparently more than offset by increases reported for paving and road-making and for railroad ballast.

The total value of all sand and gravel produced in 1929 was $132,835,979 f. o. b. plant, an increase of 11.4 per cent over 1928, and the highest figure since the beginning of the statistical record.

Because sand and gravel are commodities of relatively low specific value per unit of weight, available sources of supply are generally developed as close to markets and points of consumption as practicable. Hence the production of sand and gravel is widespread throughout the country, no state being without some phase of the industry. The production attained in a given locality, however, is directly related to the structural and industrial requirements of the area. New York and Illinois, with outputs of 21,061,094 and 18,256,203 tons, respectively, were the largest producers in 1929. Other states producing more than 10,000,000 tons are as follows in the order of quantity produced: Michigan, California, Ohio, Pennsylvania, Indiana, and Wisconsin. New York and Pennsylvania led the states in total value of production in 1929.

Louisiana Opens $8,000,000 Bids for Highway Construction

The Louisiana highway commission has just opened bids on highway construction involving an expenditure of $8,000,000 to $9,000,000. Additional bids will be opened by the commission March 17, bringing the total to $27,000,000 within the last few months. Thirty-seven different projects covering 439 miles of construction in some forty parishes of the state are included in the work for which bids have been received or asked. Of this work 285 miles will be concrete paving. The road construction work under way or soon to be started is the largest in the history of the state.

Proration—the Answer of Industry to the Menace of Overproduction*

By HAROLD WILLIAMS
Attorney, Boston, Mass.

OVERPRODUCTION in this country today has brought in its train destructive competition, ruinous price depression and, for the time at least, serious economic disorganization. Where salesmanship can no longer create or even sustain demand, the only alternative is to decrease supply. Any scheme to diminish industrial output must divide the burden of contraction proportionately. The crude oil industry, a conspicuous victim of present-day conditions, has to a large extent accomplished systematic reduction of supply. This industry has many features peculiar to itself, but there is much of interest, if not of application to other industries in what the oil business has done by way of proration.

Oil production is highly individualistic and competitive. There is no property in oil until it is reduced to possession, and so, when oil is discovered in an area, every landowner must hasten to get out as much oil as he can for himself before his neighbors get in ahead of him. Drilling thus becomes a race in which no attention can be paid to market requirements, and overproduction is an almost certain consequence.

Indiscriminate competition in drilling not only results in economic waste from production in excess of demand, but also in appalling physical waste through loss of natural gas and consequent low percentage of oil recovery. Recently in California $10,000,000 worth of natural gas was lost in taking out $5,000,000 worth of oil and gas products. Restriction of the output of oil in the larger oil fields of pools has therefore become an urgent measure of public policy for the conservation of natural resource.

In 1924, President Coolidge, by executive order, created the Federal Oil Conservation Board with the secretary of the interior as chairman. With the aid of the American Petroleum Institute and a voluntary committee of five, the Oil Conservation Board has periodically published information as to probable future demand, estimated necessary production, and reasonable allocation of requirements between the larger producing states. The last such report was released November 8th, calling for a further reduction of output and recommending a schedule of proration. Texas, California, Oklahoma and other great oil states have accepted this recommendation and in turn have further prorated their respective allocations among their own areas through local commissions and producers' associations.

State Regulations

Proration within the states has been brought about under state conservation statutes, the conservation of the natural resources of a state being peculiarly a matter of the sovereign police power of the states. Under the various state statutes elaborate systems of regulation have been evolved and it may fairly be said that proration in the oil industry is an accomplished fact.

We have, therefore, in full operation with the approval of federal and state governmental authority and the cooperation of the business itself, a well organized system limiting the output of a necessary raw material. It becomes of interest to consider how far all this is legal, and if it can be done in the oil industry, to what extent would similar arrangements be lawful in other industries, as for instance, in the production of crushed stone.

It may be that the crushed stone business could never agree upon a schedule for cutting down the supply to save the price. It is probable also that no state would attempt to regulate stone production by law, and that the industry would protest against any such attempt if it were made. And yet it is of general interest at least, for those engaged in any branch of raw material production, to consider whether cooperative measures of this kind can safely and legally be adopted if necessity for them should arise.

There are two main legal problems. First, how far can a state limit the production of raw materials on the theory of conservation of natural resources, and not come into conflict with the constitutional prohibitions against taking private property without due process of law, and denial of the equal protection of the law.

Very recently, state conservation laws have been held constitutional in Oklahoma and California, and systematic proration carried on under them upheld. In Oklahoma, the statute includes under the head of forbidden waste:

> "Production in excess of transportation or market facilities or reasonable market demands."

The supreme court of Oklahoma said that oil is wasted or lost in storage above ground and consequently production beyond market requirements leads to physical waste and can lawfully be prevented by proration. There was a vigorous dissenting opinion to the effect that what the statute really aimed at was not protection of a natural resource in the public interest, but preservation of the private interests of industry by stabilizing the price of its products. The decision does not, of course, go as far as that, but it does distinctly approach the proposition that preservation of an industrial structure may be a legitimate matter of public concern, and that incidental stabilization or even increase in prices does not make it unconstitutional. This decision, which we are told is not to be taken to the

*An address delivered at the 1931 convention of the National Crushed-Stone Assn.

United States supreme court, stands as the foremost expression of liberal and constructive judicial thought on this topic.

The federal courts have not yet directly dealt with state proration statutes, but cases are pending in the United States Courts in Texas and Oklahoma which will probably find their way to the United States supreme court. Until that tribunal deals with the subject, it seems likely that oil proration will continue to exist under the protection of state conservation laws.

Inside Agreements

The second, and much more important, legal problem concerns agreements and understandings within the industry to bring about proration. How far is it legal for associations or business groups to make agreements to limit production of a necessary raw material? Production is not commerce, but it may affect commerce. The Federal anti-trust laws forbid unreasonable restraint of interstate commerce. Certain sorts of agreements such as those fixing prices are held contrary to law, whether in fact the prices agreed on are reasonable or not. Agreements to restrict output would probably be considered illegal even though reasonable, unless they were justified strictly as conservation measures which affected or limited interstate commerce merely as an incident. Even contracts among adjoining owners of oil land for unit operation of oil pools were regarded by the Federal Oil Conservation Board and a committee of the American Bar Assn. investigating the subject for them as of such doubtful nature that specific legislation was recommended to exempt them from the operation of the anti-trust laws.

Obviously, therefore, it is extremely doubtful whether concerted curtailment of output can safely be carried on under the guise of conservation, with the anti-trust laws as they are today. Physical conservation of natural resources has long been recognized as of such importance to the public as to justify legislation regarding it. Economic conservation of industrial organization has not yet come to be so considered, and unless a disturbance of the mechanism of business can be shown to result directly in physical waste of a natural resource, as was found in the Oklahoma case, there is no recognized basis for legislation. In any business such as the production of crushed stone, it would presumably be difficult to establish the fact that overproduction, however disastrous economically, tends to produce actual physical waste. The extent, if any, to which crushed stone piled on the surface of the ground is subject to deterioration or shrinkage, is a matter which you yourselves are best qualified to determine. Probably, too, the potential supply of crushed stone is so vast that there is no practical need of measures to conserve it.

Conservation a Sound Basis

It would therefore seem unsafe to rely on the doctrine of conservation as a sound basis for economic relief. This conclusion is emphasized by the supreme court of the United States in its latest opinion on the Sherman Act, in which it is said that:

> "In order to establish violation of the Sherman Anti-Trust Act, it is not necessary to show that the challenged arrangement suppresses all competition between the parties or that the parties themselves are discontented with the arrangement. The interest of the public in the preservation of competition is the primary consideration. The prohibitions of the statute cannot be evaded by good motives. The law is its own measure of right and wrong, of what it permits, or forbids, and the judgment of the courts can not be set up against it in a supposed accommodation of its policy with the good intention of parties, and it may be, of some good results."

The United States supreme court stands, as it must stand, for rigid adherence to the statute law, and if the policy of the Government toward coöperative arrangements is to be relaxed, any such leniency must come from a change by Congress in the anti-trust laws.

In discussing any amendment of the law, it would be wiser not to rely upon the doubtful protection of the principle of conservation, but to advocate frankly the recognition in our statute law of the growing sentiment that there is a public interest in the preservation of those complex industrial structures that are the greatest expression of our national genius; a public interest outweighing in permanent common advantage any temporary benefit to be derived from the opportunity of buying in markets shattered by abnormal competition.

As the Federal Oil Conservation Board has aptly put it:

> "The interdependence of American industry and commerce is a recognized and inherent incident of our whole economic structure . . . A serious maladjustment of one of these great industries must react upon the others. Then the depression in the outstanding industries influences a similar condition throughout the industrial and commercial life of the nation."

President Hoover in his message to Congress on December 3, 1930, said:

> "The people have a vital interest in the conservation of their natural resources; in the prevention of wasteful practices; in conditions of destructive competition, which may impoverish the producer and the wage-earner; and they have an equal interest in maintaining adequate competition. I therefore suggest that an inquiry be directed, especially to the effect of the workings of the anti-trust laws in these particular fields to determine if these evils can be remedied without sacrifice of the fundamental purpose of these laws."

Representative Graham of Pennsylvania has given notice that a resolution will be introduced in Congress providing for a congressional inquiry in accordance with the President's suggestion, and it seems almost certain that the entire subject will be considered by the present Congress.

If any wide and inclusive measure of relief is to result, it should not be confined within the comparatively narrow scope of conservation of natural resources, but should be based upon the broader

(*Continued on page 54*)

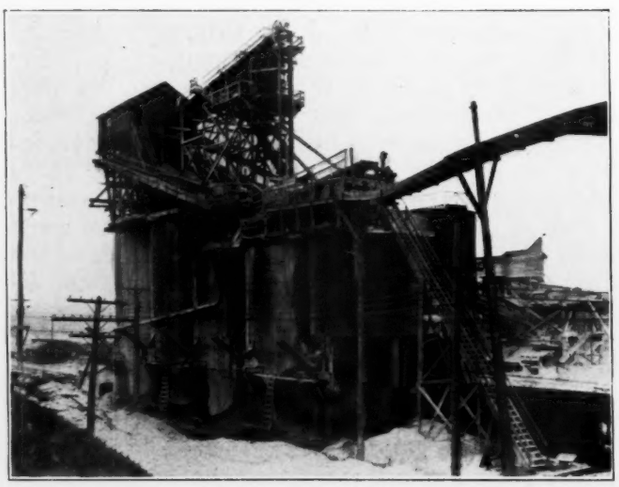
A general view of the Paris, Ont., plant of Consolidated Sand & Gravel, Ltd., with the secondary crusher building at left and the bins and screening plant at right.

Increases Production 50 Per Cent With a Smaller Operating Force

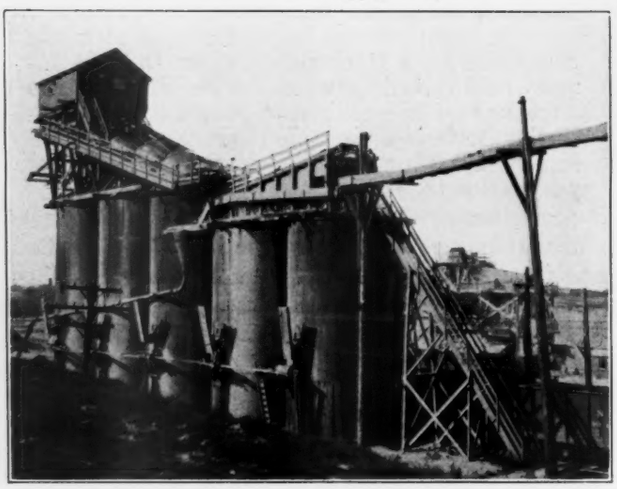
Toronto Producer Steps Up Efficiency by Redesigning Sand-and-Gravel Plant

By W. E. TRAUFFER

WHEN a sand-and-gravel plant, due to increased demand for its product, must be enlarged or when some improvement is made necessary by changing conditions in its trade territory, the customary program of improvement usually calls for an expensive reconstruction of the plant. When a change in the method of excavating and handling the raw material is also called for by conditions which have developed since the plant went into operation, the expense of the improvement program is generally so great that it is more economical to build an entirely new plant.



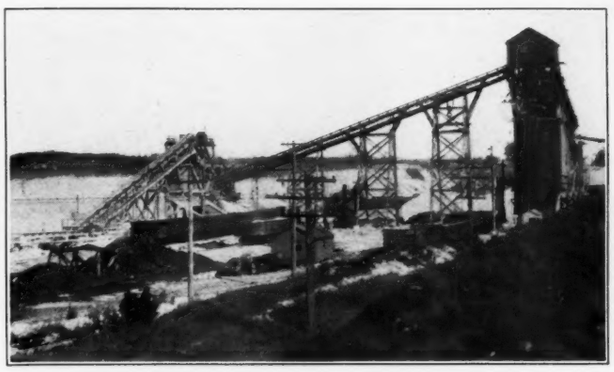
The screening plant and bins as they are now.



The screening plant and bins before the plant was enlarged.

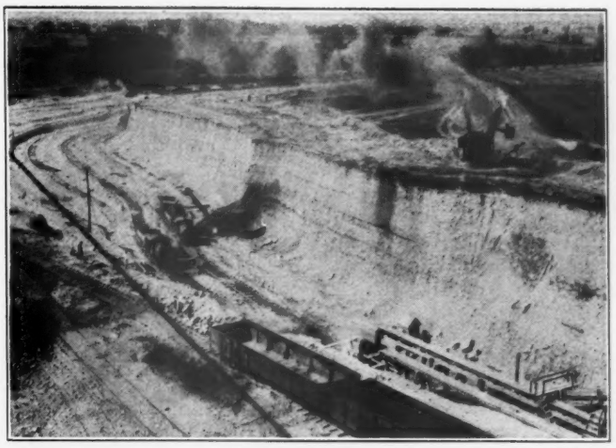
Consolidated Sand & Gravel, Ltd., of Toronto, Ont., one of the leading producers of sand and gravel in Canada, was recently confronted with this problem in its plant at Paris, Ont., and solved it in an unusually efficient manner and at a comparatively small expense. Its problems were to install a new type of pit operation better suited to its conditions, to increase the plant production and the number of sizes produced, to provide for the separate handling, screening and storage of crushed aggregates, and to

provide for the loading of mixed sizes. The extent of the changes necessary is evident from the fact that the original plant, although modern in every respect, was designed to produce only standard sizes of aggregate, the crushed gravel being mixed in with the balance. The plant capacity was increased from 200 tons per hour to 300 tons per hour. As long as the capacity had to be increased it was decided to leave the present screening and storage arrangement as it was, to screen crushed material separately, and to store it in separate bins. A tribute to the changed design is the fact that a 50-per cent increase in production was obtained with a decrease of 30 per cent in the number of men required to operate the plant.



Another general view of the plant taken before its enlargement.

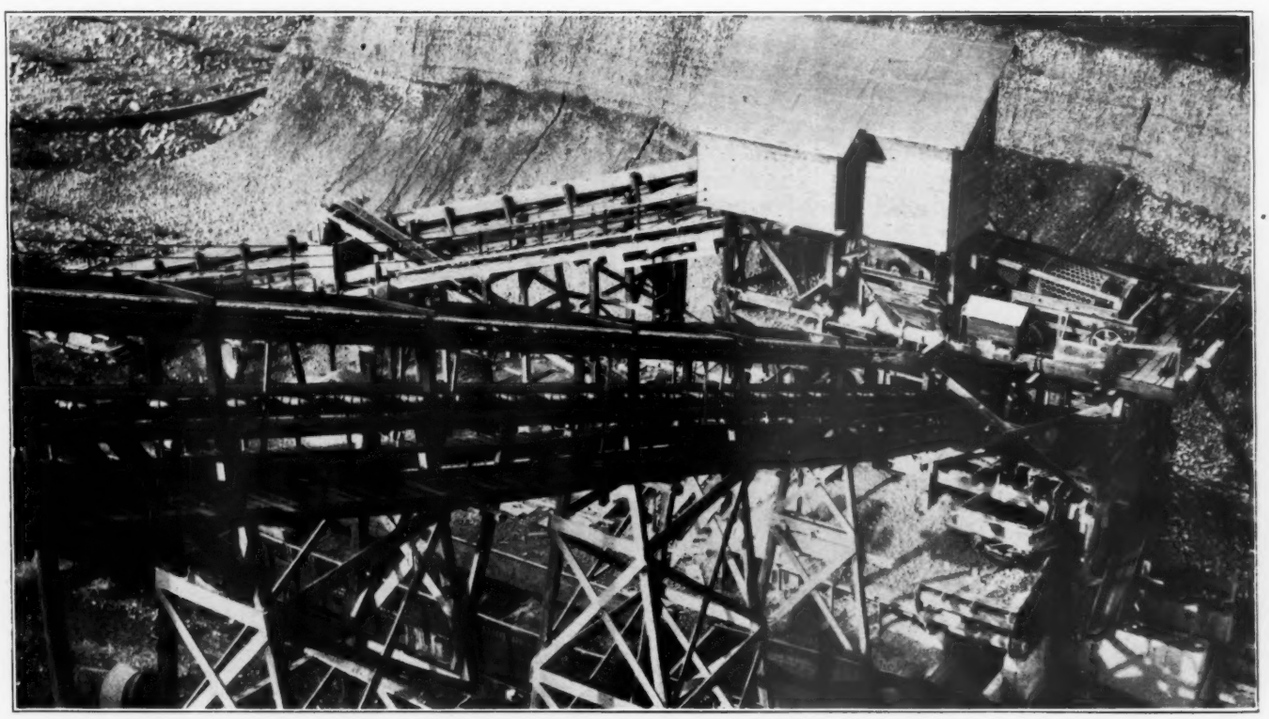
The plant was originally designed by the Link-Belt Co., which also furnished most of the equipment, and went into operation in May, 1928. A number of minor changes were made in the next few years, including the lowering of the plant hopper which was made necessary by the opening of the pit to a deeper level. The changes which are described in this article were begun in January, 1930, and were completed on April 1 of the same year. No operating time was lost because of these changes, as the plant closes in the winter.



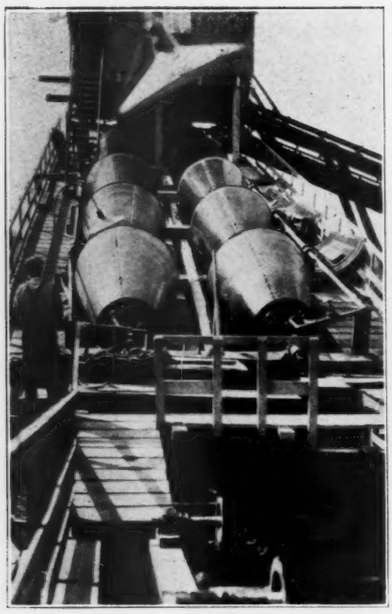
A view of the pit operations and deposit under the old system.

Before the changes were made gravel was loaded into dump cars by shovels and hauled to the plant hopper by steam locomotives. The hopper fed onto a belt conveyor which discharged at the top of the crushing plant into a revolving scalping screen. The oversize over 5-in. went to a primary crusher, that from 2½ to 5-in. to two smaller crushers and that passing the 2¼-in. screen onto a belt conveyor to the screening plant. A horizontal return conveyor took the product of all three crushers back onto the main conveyor forming the usual closed circuit.

The gravel was washed and sized at the screening plant by two scrubbers and two sets of inclined conical screens. The gravel was chuted directly into

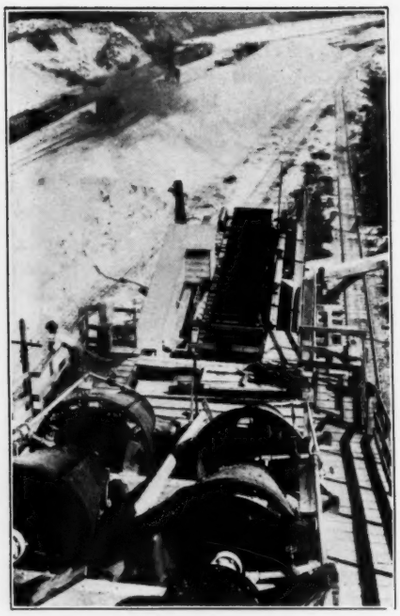


Looking down on the scalping and secondary crushing plant from the screening building. Note the double conveyor for crushed and uncrushed gravel.



Close-up view of the sand drag and screens before the plant was changed.

The return conveyor system which was abandoned when plant was enlarged.



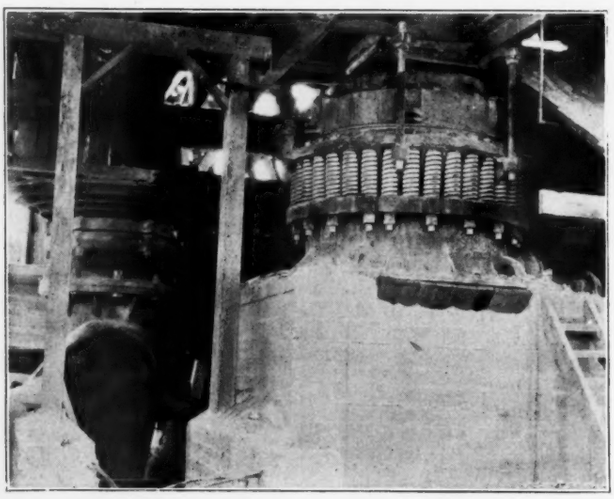
Another view of the screens and sand-drag box before the plant enlargement.

bins, while the sand went to a dewatering flight conveyor. The five sizes of material produced were stored in five circular steel bins with a total capacity of 1,250 tons. The above brief description of the former method of operation will give the reader an idea of the flow of the material as compared to the present flow.

The property of 200 acres is located on the Grand River just outside the city limits and north of Paris, Ont. It is located on the main lines of the Canadian National Ry. and of the Lake Erie & Northern Electric Ry. The latter also connects with the Canadian Pacific Ry. at Galt, 14 miles north of Paris, permitting shipments to be made economically in all directions. The plant was originally designed for rail shipments only but, at the time the plant was enlarged, facilities were installed for making truck shipments for local road work.

The deposit is of a different type than is commonly found in this country. It is in the form of a large plateau with well-graded gravel containing about 16 per cent sand to a depth of 40 feet. Below this level the percentage of sand decreases and the rocks gradually become larger until they are almost the size of boulders, and are too large to be crushed economically. The overburden, which averages about 2 feet in depth, is removed by an Osgood 1-cu. yd. electric shovel and hauled away in trucks to a nearby dump.

Although the deposit contains little of the conglomerate so common in that part of Ontario, its gradation is such that the 40-ft. face being worked is almost vertical and caves only when undercut with the shovel. This would seem to be a dangerous condition, but as only a small section of the bank caves at one time the shovel has never yet been blocked. A Bucyrus-Erie 50-B, 2-cu. yd. electric shovel handles the aggregates to the portable steel feed hopper on the field conveyor. A 12-in. rail grizzly over the hopper rejects stone too large for the primary crusher.



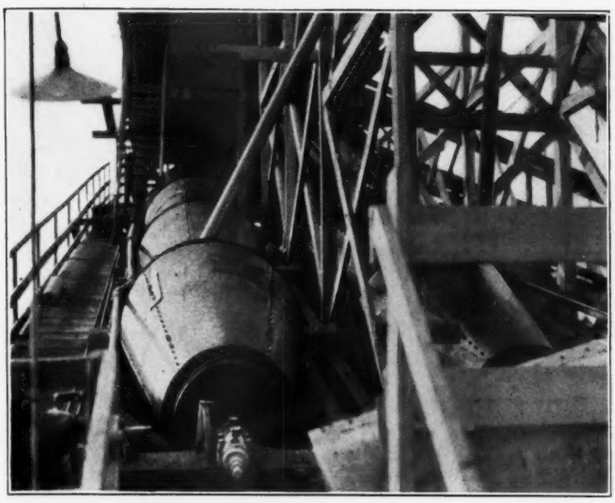
The two secondary crushers, cone type at right and gyratory at left.

Shovel loading gravel to traveling hopper on field conveyor. Note almost vertical bank of gravel.

The field conveyor system being used consists of

two 30-in. belt conveyors at right angles to each other. The first conveyor, which is about 800 ft. long, is parallel to the face of the pit and is kept at a distance which enables the shovel to feed the hopper efficiently. The second field conveyor onto which the first discharges is stationary and at right angles to the face and is now about 350 ft. long. The method followed to keep the shovel and plant busy while the field conveyors are being shifted is interesting.

After a cut along the length of the face is completed the shovel is moved to the end of the second conveyor where it makes a cut ahead of the conveyor, feeding to a stationary hopper at the end of the conveyor. While this is being done the first field conveyor is moved the width of a cut, or about



The original screens and the framework for the crushed-gravel screening plant.

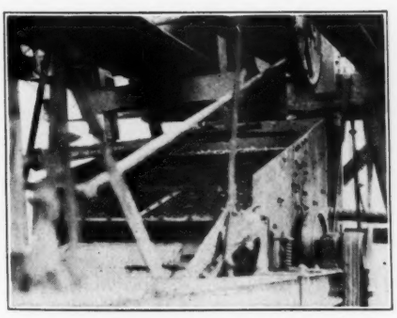
30 ft., toward the face. The shovel then makes another 800-ft. cut along the face, during which time the second conveyor is again extended 30 ft. This cycle is repeated again and again and has worked very satisfactorily. No operating time is lost, as the shovel makes its long move from the end of the first conveyor to the second after working hours and the splicing of the additional conveyor belting made necessary by the extension of the second conveyor is done at the same time. The portable field hopper is easily moved, as it runs on two rails straddling the conveyor. The height of the face makes only infrequent movement of the shovel necessary.

The first field conveyor discharging to the second. Shovel loading in background.

The first field conveyor is driven through a Link-Belt silent-chain drive and gear by a 35-hp. motor. The second conveyor is inclined at its discharge end and is driven through a tandem pulley arrangement by a 40-hp. motor. The motor drives the lower pulley which, in turn, drives the upper pulley through direct gearing. Both drive pulleys and the accompanying idler pulley are mounted on horizontal wooden beams so that the belt tension, which will vary each time the conveyor is lengthened, can be increased or decreased by moving all three pulleys in one direction or the other.

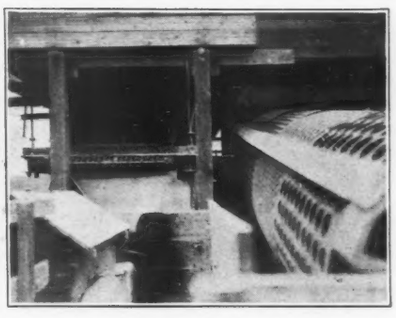
The second conveyor discharges over a sloping 4½-in. rail grizzly, the throughs dropping to a hopper and the oversize into the Allis-Chalmers McCully No. 7½ gyratory primary crusher which was formerly located under the crusher building. The crusher discharges directly, and the hopper, by means of a Link-Belt 36-in. pan feeder, onto the 36-in. main conveyor to the secondary crushing plant. This conveyor operates on 250-ft. centers and is driven at its head by a 50-hp. motor through a silent-chain and gear drive. The feeder is driven from the tail pulley of this conveyor and the crusher is belt-driven by a 75-hp. Allis-Chalmers motor.

This conveyor discharges through a chute into the Link-Belt 5-ft. by 20-ft. revolving scalping screen, which has three sections with 2-in. and one section with 4-in. perforations. The gravel under 2 in. in size drops onto a 30-in. inclined belt conveyor on 158-ft. centers to the screening plant. The stone over 4 in. in size drops to a No. 5 Allis-Chal-



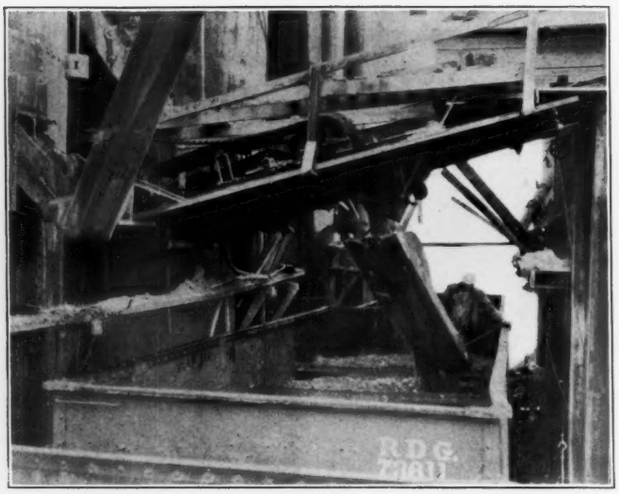
The four-deck vibrating screen in the crushed-gravel plant.

The primary crusher which was moved from the plant into the pit.



The original revolving scalping screen at right with new vibrating screen.

Discharge of the double conveyor from the scalping building.



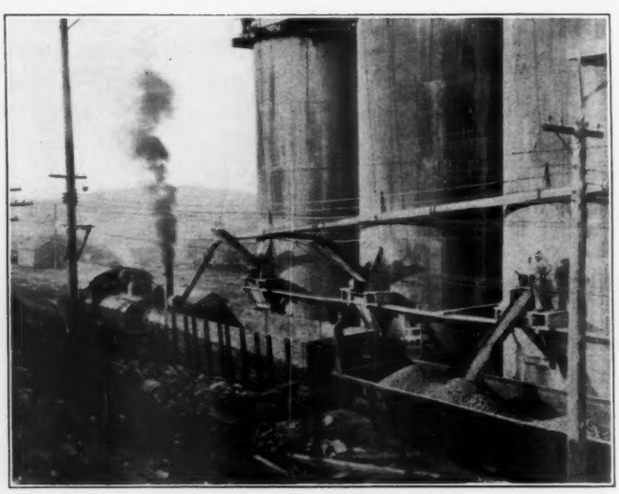
The mixed-gravel loading conveyor and the movable spout.

mers Gates gyratory crusher and that from 2 in. to 4 in. to a No. 4 Symons cone crusher. Both of these reduction crushers discharge onto a 24-in. inclined return conveyor on 76-ft. centers which discharges onto a 24-in. by 70-ft. conveyor running parallel to the main conveyor from the crusher to the top of the crusher building. Here the crushed stone is discharged to a 4-ft. by 6-ft. triple-deck vibrating screen with 2-in., 1½-in. and ¾-in. screen cloth. The stone over 2 in. in size is again fed to the Symons crusher.

The 1¼-in. to 2-in. stone and that passing through the ¾-in. deck of the vibrating screen both discharge to the same conveyor as the uncrushed gravel previously described. The ¾-in. to 1½-in. stone from the vibrating screen discharges to a second conveyor to the screening building, which is a duplicate of the first except that it is 24 in. wide and is mounted above it on the same framework. The lower conveyor is driven through a silent-chain-and-gear drive by a 30-hp. motor and drives the stone conveyor by chain at their head pulleys. The crusher return conveyor is driven by a 15-hp. motor and the conveyor to the vibrating screen by a 20-hp. motor, both through silent-chain-and-gear drives. The Gates crusher is driven by a 40-hp. motor and the Symons crusher by a 100-hp. synchronous motor, both through drive belts. The scalping screen is silent-chain-driven by a 25-hp. motor. The two inclined return conveyors which receive the crusher discharge were made from the single long horizontal conveyor used in the former set-up.

The top belt conveyor discharges onto a 24-in. belt conveyor on 60-ft. centers to a four-deck 4-ft. by 6-ft. vibrating screen. Screen cloths with 1¼-in., ½-in., and ¼-in. mesh are used. As the material fed to this screen is from ¾-in. to 1½-in. nothing goes through the first ½-in. deck and only two sizes are produced. These are chuted to two of three steel bins which have been added to the original storage capacity of the plant. The feed chute of this conveyor is so arranged that, in an emergency, the material going to the vibrator can be diverted to join the uncrushed material.

Left to right: George Duff, master mechanic; A. G. Bennett, engineer and gen. supt.; J. Graham, plant supt.



Loading from bins into cars for shipment. Note waste-water discharge pipe.

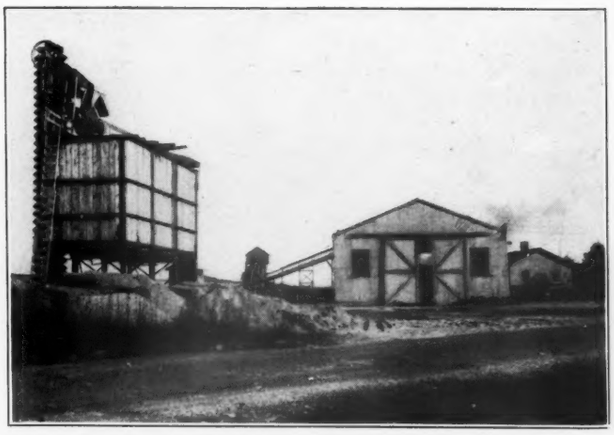
The lower conveyor discharges, just as it did before the plant was rebuilt, through a split chute into two sets of Link-Belt Dull 72-in. by 36-in. by 96-in. inclined conical screens, each set consisting of a scrubber and four screens. These screens have 1½-in., 1¼-in., ¾-in., and ⅝-in. perforations and produce four sizes of gravel, three going directly to storage. The smallest size, ⅝-in. to ¼-in., discharges by chute to a bucket elevator which feeds

to the third deck of the vibrating screen previously mentioned. The gravel retained on this ½-in. deck goes to one of the original bins. That retained on the ¼-in. deck goes to the third bin of the new unit, while the throughs from the bottom deck go to the sand bin. The material passing the ¼-in. revolving screens is fed into a Link-Belt 48-in. by 27-ft. dewatering flight conveyor which discharges to the sand storage bin. A 30-in. conveyor under the sizing screens can, when desired, be fed with material from any one or more of the screens, or from any screen or screens in either unit as each is independently controlled. This conveyor is used to produce

Locomotive crane loading sized material from stock-piles into cars for shipment.

any desired size of mixed gravel which is chuted to one of the bins.

The original bin unit consists of five circular steel bins, each 19 ft. in diameter, which support the screen house. The two highest bins are used for the two larger sizes of gravel and have a capacity of 300 tons each. Each of the third and fourth bins has a capacity of 225 tons. The third is used for



The new truck-loading plant at left with the new machine and locomotive house at right.

¾-in. to 1¼-in. gravel, while the fourth is used for mixed sizes. The fifth bin, with a capacity of 200 tons, is used for sand. The three new bins are also of steel and are of the same diameter as the original units. Each bin has a capacity of 300 tons. They are located alongside the other bins in a row parallel to them with a loading track between.

All the eight bins discharge on either side through drop chute gates into cars. There is also an arrangement which allows loading of sand and mixed sizes combined for which there is some demand. Gates in the sand and mixed-size bins feed to a conveyor which loads into cars. A swinging chute at the end of this conveyor permits cars to be loaded without segregation. The washers and screens are spur-gear and silent-chain driven by a 50-hp. motor and the sand wash box by a 35-hp. motor of the same make.

A new unit for truck-loading was installed at the time the other plant changes were made. This is located near the office building and repair shop and is on the road leading in to the office. The Western 12-cu. yd. dump cars formerly used in the pit are used to haul gravel from the plant to this unit. They dump into a concrete hopper alongside the track. A Link-Belt bucket elevator takes the material to any of the three compartments of the 50-ton steel-

Discharge of second field conveyor over grizzly to crusher.

The tandem-pulley drive of the second field conveyor.

The stock-piles of sized aggregate and storage tracks with locomotive crane loading cars for shipment.

framed timber bin. Trucks are loaded through bottom discharge gates. A new locomotive house and machine shop was also erected during the past year. This has a 40-ft. pit for locomotive repairs and has equipment for making almost any repairs including the rewinding of electric motors. The plant office is in a wooden-frame building which also houses a neat and complete parts storage room.

There is ample storage space near the plant for both cars and surplus material. During periods of slack demand, gravel is loaded from the bins into flat-bottom gondola cars and is unloaded into stock-piles by an Industrial Brownhoist Co. steam locomotive crane equipped with an Owen 1-cu. yd. clam-shell bucket. Rehandling from storage into cars for shipment is also done by this crane. Because of the small percentage in the deposit there is a ready sale for all the sand the plant can produce and it is seldom stock-piled. All switching, spotting and hauling of cars is done by two 60-ton, 6-wheel saddle-tank steam locomotives.

A. G. Bennett, chief engineer of Consolidated Sand & Gravel, Ltd., designed the new layout and personally supervised the changes. Most of the equipment used in this plant was furnished by the Link-Belt Co., including belt conveyors, elevators, feeder, scrubbers, revolving screens, flight conveyor, bin gates and silent-chain drives. Goodyear conveyor belting is used on most of the conveyors. English Electric Co. electrical equipment and motors predominate, although some Canadian General Electric motors are used. Power is received from the Ontario Hydro-Electric Co. through the substation at the town of Paris at 2,200 volts.

Water used in the plant operations is pumped from the Grand River through 2,000 ft. of pipe-line by a DeLaval centrifugal pump which handles 3,000 g.p.m. at 150 ft. head. Waste water from the plant runs into a 10-in. wrought-iron pipe-line which discharges into a settling pond cut into the bank of the river, allowing most of the dirt to settle out before going into the river. The water spilled from the bins runs into a concrete sump. A building over the sump houses a Canada Steam Pump & Machine Co. 3-in. by 4-in. vertical centrifugal pump which feeds through an automatic check valve and a Jenkins gate valve into the main discharge line. The pump is belt-driven by a 15-hp. motor through a Gutta Percha Rubber & Mfg. Co. drive belt.

The plant at Paris, which is one of the largest in Canada, is only one of four operated by this company. The others are located at Durham, Fuller and Waterford, Ont. The company also operates a number of sand-suckers, boats and barges under the name of the National Sand & Gravel Co., Ltd.

Portland-Cement Plant in Mexico

(*Continued from page 22*)

by 22-ft. compartment finish-grinding mill by a table feeder.

The finished cement from the mill will be delivered to the concrete storage silos by a screw conveyor and a bucket elevator. It will be withdrawn from the storage silos by a screw conveyor and delivered to the packer bin by a bucket elevator. Immediate expansion in this department is contemplated and provisions are being made for the installation of Fuller-Kinyon pumps.

Packing will be done with a Bates two-tube packer and the product will be loaded into cars or trucks or it will be stored.

All the electric motors used in driving the various units of equipment were furnished by the Westinghouse Electric & Mfg. Co., and all possible drives have been direct-connected through speed-reduction units furnished by the Pacific Gear & Tool Co.

Three Worthington 360-hp. Diesel engines, direct-connected to Westinghouse generators, will furnish all the power for the plant.

The Traylor Engineering & Mfg. Co. furnished the major portion of the equipment such as crushers, compartment mills, kiln, feeders and stone elevators.

All engineering for the complete plant is being done by the Macdonald Engineering Co. of California in its San Francisco office, and all construction work and machinery installations are being handled by its construction forces at Hermosillo.

Proper Usage and Frequent Lubrication Will Prevent Wire-Rope Failure

The following material is condensed from a copyrighted article that was prepared by the engineering staff of the Williamsport Wire Rope Co., to appear in a forthcoming catalogue. The statements and pointers apply to wire ropes in general and may be read with benefit by the users of such ropes for hoisting, haulage, excavation and miscellaneous jobs in pits, quarries and mills.

THERE is no part of plant equipment that is more dependable than wire rope and that probably receives less consideration and more abuse. Wire rope is an accurately-made, finely-finished product and should receive the same consideration and care as other kinds of equipment.

It is not always a reflection upon wire rope if it disintegrates on an operation within a seemingly short time. When this happens one should not immediately blame the wire rope, but he should look for causes that may prove contributing factors in shortening the life of the cable.

Here are some of the most common causes that shorten the life of wire rope in various operations and, hence, are things to avoid: drums and sheaves of too small diameters, reverse bends, rope of insufficient strength for load, rope of wrong construction for the service required, overwinding on drums, lack of lubrication, rope damage in handling or kinking, insufficient or faulty guides and rollers, sheaves out of alignment, deeply worn grooves, broken rim or grooves scored by old rope, sheaves that turn hard or wabble because of worn or damaged journals, displaced rope guards, stones or other objects lodged or anything that rubs or cuts the rope, sticky or grabby clutches, bent shafts, and loose bearings or anything that causes the pull on the rope to be uneven or jerky.

Some things that are not so obvious as the above but that seriously affect rope life, chiefly from overstress, are: jerking, slack, acceleration of load, impact, and differential stresses produced in multiple-groove drums.

In any kind of hoisting operation it is important that the rope shall have no slack at the beginning of hoisting, else the load will be applied suddenly and the stress will be much in excess of that due to the load.

Exhaustive tests proved that acceleration greatly increased the rope stress beyond that usually figured, due to the rope's elasticity. Tests on a 1½-in.-diam. rope under actual operating conditions showed an increase of 130 per cent.

The force of a hammer blow is due to impact. A hammer weighing only a few pounds can produce a blow of many tons, merely because its movement is arrested suddenly. Similarly, if even a light load while being lowered be stopped suddenly, the rope will be subjected to a stress much greater than the power which the machinery could apply to it in hoisting.

If you take a piece of twine and pull it gently, you'll find it will stand an unusual strain before breaking but, if you snap the same cord quickly, it is easily broken. You will get the same effects with wire rope or any other kind of rope. Don't "snap" your wire rope. Start to hoist slowly.

When a wire rope, or any other material, is subject to accidental damage, the accidents do not occur at regular intervals. One wire rope may last longer than another because it has not been damaged as much.

Because the outside wires of rope are broken is not an indication that they are brittle or that they have failed from bending and fatigue. It is just as probable they were pulled in two. The outer wires have a higher stress than the inner wires even when the rope is straight. This is because they lie at a greater angle to the rope's axis. The outer wires are also subjected to more stress than the inner wires when the rope is bent.

A wire rope may fail from overstress and yet actually part, at some later time under comparatively light load, due to fatigue during operation. The action of failing is not always instantaneous because, at each repeated stress, the rope or material approaches failure and becomes less able to resist stress. It may reach a point close to failure under a heavy load and then actually fail some time later under a much lighter load. Wires, strands or an entire rope may break if the rope is kinked or if it has been severely jerked.

Vibration and whipping are destructive actions on wire rope. It is easy to understand the jerk or shock that occurs at a fastening when the rope whips. Vibration has somewhat the same effect; the amount of force is small but it builds up an extremely large number of "blows" in a short time.

The manner of running a machine always affects its general maintenance. Some people are harder on machinery than others. Frequently an operator who is hardest on the machinery is the most efficient from an economic standpoint because he receives sufficient additional production to more than offset the additional cost. When this policy is pursued, there can be no basis or criticism of wire rope.

Avail yourself of the service of wire-rope experts, although you may feel perfectly competent—and perhaps you are—to judge the proper rope to be used and the conditions under which you use it. As a rule, service engineers are heartily willing to give conscientious and unselfish opinions on questions submitted to them. They are meeting, every day, various conditions viewed from many angles, and their experience is worth having. They have assisted hundreds of users in obtaining maximum

service from their equipment. This service is given freely to all wire-rope users, regardless of the makes of rope.

One construction and grade may be well suited for underground mining operations but wholly inadequate for a dragline or an excavator. Another construction and grade may be proper for ship riggings but wholly unsuited for crane work. Each operation must have the proper wire rope.

An accurate history of every rope should be kept. In this manner the user will not only secure greatest efficiency from his wire rope, but he will learn which grade and construction is best for his service.

When wire rope is left idle for some time and the operation again starts, a rapid deterioration may be expected in the rope. It is the nature of steel and hard fiber to deteriorate and nothing can be done to prevent it if wire rope is left exposed on the operation. The proper way to preserve rope on an operation that is "shutting down" is to take the rope off and put it on a reel after lubricating it with a good grade of heavy lubricant. When reeling the rope, be sure to place it on the reel the same way it was bent around the drum. Use the same precaution when putting it back on the drum.

The change of a rope from one operation to another may mean quick destruction. In past years many operators have "borrowed" ropes from one operation and installed them on others, to keep the ropes in service. The result was rapid deterioration and a consequent criticism of the wire rope. If a wire rope be moved from its original installation and subjected to duty on sheaves of a different size, direction or operation, it may go to pieces in a short time.

An operator must expect rapid disintegration when a wire rope is used on a foundry crane and subjected to severe heat. Wire rope with hemp centers cannot be used in such service with good results. It should contain a wire-strand center.

Lubrication of wire rope is important, but it is neglected more than any other thing pertaining to the care of rope. Wire rope should be lubricated frequently with a thorough application of good oil, free from acids and corrosive substances, of a consistency that will penetrate to the center of the core and yet heavy enough to remain as a coating on the outside. The life of a wire rope is materially increased thereby, since the lubricant is not only a protection against rust but it lessens the friction between the wires. Wire rope should be coated with grease when idle, for then the chances of rust destruction is greatest.

Treat your wire ropes with the same care you give to other machinery and they will give you a full measure of good service.

Proration—the Answer of Industry

(*Continued from page 45*)

principle that there is no constitutional right to buy below cost; that the immense aggregations of capital invested in organized business have a right to the fair and reasonable return without which business cannot continue to exist; that the people both as wage-earners and consumers are vitally concerned in the stabilization of industrial conditions; and therefore that legitimate industry should be entitled to take reasonable coöperative steps to protect itself from the evils of excessive competition in time of extreme overproduction.

The exact form which such legislative relief should assume is a question which calls for deep study and thought on the part of those charged with the responsibility of enacting it. It has been suggested that some sort of industrial tribunal should be created with authority to pass upon and sanction agreements of this character, where the rights of the public were not invaded. It would be presumptuous to attempt here to prescribe or define a remedy, but it may not be impertinent to touch upon some of the general principles which should enter into any consideration of the question. In considering any amendment to the anti-trust laws, it must constantly be borne in mind that the people as a whole have a vital interest in agreements affecting or limiting free competition and that if such agreements are to be made permissible, they will have to be subject to some degree of governmental regulation and control. There is always the danger that the price of governmental aid may be governmental intrusion and supervision. There is, on the other hand, a healthy tendency to allow business to regulate itself, such as is manifested by the attitude of the Federal Trade Commission toward the trade associations, which we had opportunity to observe at the Trade Practice Conference last year in Cincinnati.

Action within the industry must of course be voluntary and without suspicion of any coercion, and voluntary cooperative action in most industries is extremely hard to achieve, except where conditions are grave enough to bring about an almost unanimous sentiment. This circumstance alone would operate to protect the public from any harmful combination to restrain competition unduly, and would automatically limit concerted effort by any industry to defensive measures of protection in times of stress.

All this may appear to be of no immediate concern to the crushed-stone industry which has its own unique problems, but the time may come when it might be desirable to combine not to raise prices, but to uphold them above the level of disaster. Should Congress act at all, it is essential that its action shall be comprehensive enough to include all raw material production. If industry is to be given greater latitude, then to insure the minimum of official intervention, such self regulation within the industry must be broad gauged enough to recognize that the welfare of business is in the long run identical with the welfare of the whole consuming public, upon which the success of business depends.

Any amendment to the anti-trust laws should therefore be permissive in its nature, and leaving the initiative to the councils of business where it properly belongs, and reserving to the agencies of government the necessary function of approval and veto. Legislation along such lines would constitute the federal government an aid rather than a check upon legitimate business enterprise.

Non-Metallic Minerals to Play Important Part in North Carolina's Future

By H. J. BRYSON
State Geologist

THERE is probably no state in the Union that has a greater variety of non-metallic minerals than North Carolina. During the past few years, the production of these minerals has far exceeded that of the metallics. Dr. G. A. Bole, ceramic engineer of Ohio State University, who has visited the state several times within the past few years states that "North Carolina has large deposits of non-metallic minerals, especially those used in the ceramic industry, and should be, within a few years, one of the largest ceramic producing sections of the United States."

During the past five-year period, new processes of refining and finishing the crude materials have been installed and add much to the demand of the North Carolina products. Especially is this true in the feldspar, kaolin and mica industries. Several companies are working on methods of dry concentration of such materials as feldspar, kaolin, kyanite, mica, barite, quartz and talc as well as several of the abrasives as corundum and garnet. If the processes of concentration now being worked out prove to be economically practicable, in all probability, the production of the non-metallics will be greatly augmented within the near future. Also the new processes will revolutionize certain of the industries. As a result, higher-grade materials will be produced at much lower costs.

Abrasives

North Carolina has four types of materials which may be classed as highgrade abrasives. In order of importance these are corundum, garnet, emery and spinel.

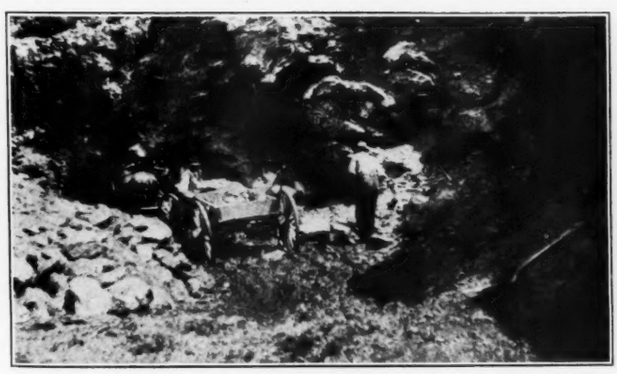
Up until 1905, this state was one of the large producers of *corundum* but there was no production from that time until 1917. In that year, 820 tons valued at $67,461 were produced. Even though this state has the largest deposits of corundum in the United States, no production has been recorded since 1920. There are sixty localities where corundum has been found but the commercial deposits occur in Clay, Macon, Jackson and Transylvania Counties. The corundum occurs in association with the peridotites, usually, but there are deposits in which the corundum is associated with quartz, chlorite and margarite schists. In the latter case, a process of concentration would have to be employed before the corundum could be used commercially. It has been reported that at least one company has worked out a process of dry concentration which will recover the corundum crystals from the schists. Several hundred pounds of schist have already been shipped for experimental purposes.

Emery, a mixture of corundum and magnetite or hematite, has been found in a number of localities but little or no prospecting has been done to determine the extent of the deposits. The abrasive quality of the material is due to the percentage of corundum present. No method of separating the corundum from the magnetite has been worked out due to the intimate association of the differing particles.

Included under *garnet* are minerals of similar physical properties and crystal habit. These minerals have a hardness of 6.5 to 7.5 and the abrasive quality depends upon the hardness and the angularity of the crushed particles. Several varieties of garnet occur in the state but those which offer commercial possibilities are almandite and rhodolite. Deposits of commercial importance occur in Clay, Jackson, Macon, Madison, Lincoln and Burke Counties. The largest deposits known, however, are those of almandite garnet, in Clay County, and the rhodolite or pink garnet, in Jackson County.

From 1901 to 1921, North Carolina was one of the leading garnet producing states but, due to competition from other states, especially New York, no production has been reported since 1923.

The *spinel* group of minerals consists of the true spinel ($Mg\ Al_2O_4$), picotite, gahnite, magnetite, and chromite. The two common varieties are ceylonite



Open-pit mine of Biotite Mica Co., Spruce Pine, N. C.

Asbestos outcrop and pits, National Asbestos Co.

or pleonaste and picotite. The analyses of the North Carolina spinels show that both the pleonaste and picotite varieties occur. These minerals are primary and were formed at the same time as the corundum. The spinel occurs generally as massive and coarse to fine granular, but it is occasionally in crystals. Through it, usually, are grains and fragments of corundum. Since the true spinels have a hardness of 8, they have a possible use as an abrasive. Other uses may be found, such as a source of aluminum and magnesium as well as for refractory materials.

Asbestos

Associated with the basic magnesian rocks of the western section of North Carolina are deposits of both the chrysotile and amphibole asbestos. Chrysotile has been found in Madison, Yancey and Wilkes Counties and has been prospected to some extent in Yancey County during the past few months. The limited amount of prospecting done, however, has not revealed any deposits of promising economic importance. The deposits in Wilkes County were prospected considerably but showed nothing of economic value.

The amphibole asbestos deposits are distributed over a belt of eight counties, paralleling and on the western side of the Blue Ridge Mountains. Deposits in Macon, Jackson, Mitchell, Yancey and Avery Counties have been worked commercially in the past. In 1919, this state ranked third in the production of asbestos in the United States. Since that time, due to competition from other fields, little production has been shown even though two plants operate when a market can be had for the product. Most of the amphibole deposits contain varying amounts of talc and usually the fiber is short and weak. As a result, the material has a value in a limited number of manufactured products.

Barytes

Barytes (barite), the sulphate of barium, is a heavy mineral, usually white in color, and is used in the manufacture of paper, in pottery glazes, in textile fillers, in the rubber industry and in the manufacture of paints and chemicals.

There are two principal areas in North Carolina where barytes deposits are found, one in Madison County, near Stackhouse, and the other in the Kings Mountain belt, Gaston County. In Madison County, the barytes occur as veins in the "Max Patch" granite and in the Cambrian formation lying unconformably on it. The bodies of this belt are the true fissure veins and the brecciated type. They are usually 4 to 6 feet in width. Over 400,000 tons of high-grade material has been shipped from this area. The veins of the Kings Mountain area occur in a pyrite-bearing schist associated with quartz, pyrite and galena. They conform to the strike and dip of the country rock. The last production was reported in 1923 when 1,179 tons were produced. The prospecting now being carried on is chiefly in the Madison County area.

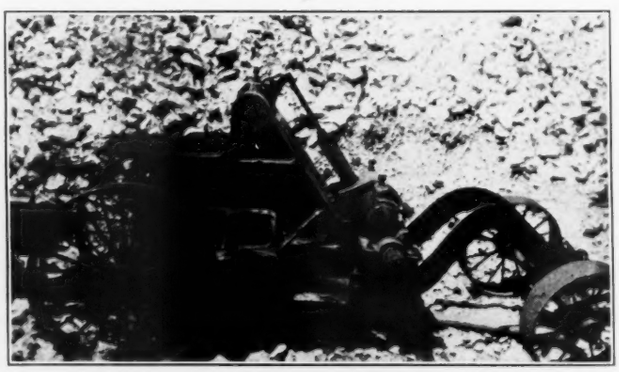
A dry process of concentration is being worked out by one company. If it proves economical the process will be installed at an early date for it will raise the barium-sulphate content well above 90 per cent as is necessary for the trade. It eliminates especially the quartz, sulphides and fluorite. From examinations made recently by engineers and geologists, there is apparently considerable tonnage of medium- and high-grade barytes available.

Plant of National Asbestos Co., Minneapolis, N. C.

Kaolin Clay

North Carolina has long been the chief producing center of residual kaolin clay in America. Three companies are producing clay, a total of seven clay-washing plants being in operation. The total production during the past few years has been approximately 20,000 tons annually, valued at about $300,000. New processes of refining or washing have been installed within the past few years. Also, a new process for the recovery of mica has been installed at all of the clay-washing plants. It is estimated that from 2 to 5 tons are recovered daily at each plant.

Prof. W. S. Bayley, in his report on "Kaolins of North Carolina" in 1925, stated that "from the data now at hand it is probable that there is enough material known to exist to furnish about 625,000 tons of refined product." However, since his report, other large deposits have been discovered in the Spruce Pine district, near Lincolnton, and in several other areas. A deposit recently drilled and explored to some extent showed several hundred thousand tons of high-grade clay. The owners of the deposit expect to develop it on a large scale. Other deposits are being discovered annually and, in all probability, the reserve is nearer 1,625,000 tons of refined material than that estimated by Prof. Bayley. At



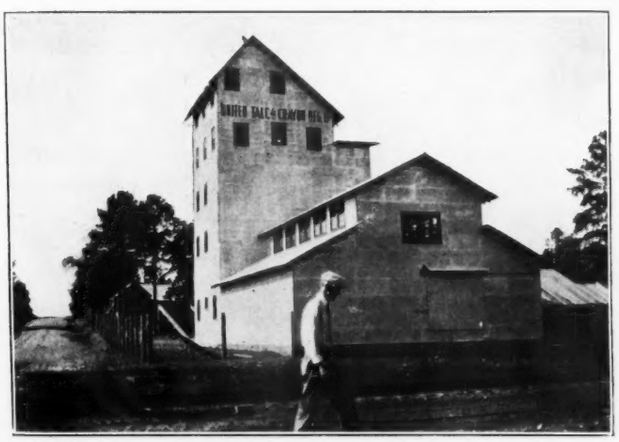
Portable crusher used by Feldspar Milling Co., Burnsville, N. C.

the present rate of production, there is a fifty to seventy-five years' supply of kaolin in North Carolina.

The kaolin clays of the state are different from those of other southern states and command much higher prices. The clays of South Carolina, Georgia and Florida bring from $4.50 to $12.50 per ton while those of North Carolina bring from $15 to $16.50 per ton. The residual clay from this state is replacing, to a great extent, the imported clays at many of the leading pottery plants throughout West Virginia, Pennsylvania and Ohio. This has been brought about by the producing companies assuring the consumers of a continued supply of high-grade clay.

Feldspar

The feldspar produced in North Carolina is chiefly the potash variety known as orthoclase and microcline. However, the soda and lime-soda feldspars are found. The principal uses of the feldspar are in the manufacture of pottery, china-ware, porcelain, enamel ware, enamel brick and tile, glass and artificial teeth. It is used also as an abrasive in



United Talc & Crayon Manufacturing Co., Glendon, N. C.

scouring soaps, as a poultry grit, in roofing materials, and in concrete work.

The production of feldspar began in 1911 when one carload was shipped. In 1915, the state ranked third in production in the United States, in 1916, second, and in 1917, first. Since 1917, the state has ranked first in the quantity and value of production, except in 1920. Today, the state produces 52 per cent of the total production in the United States. This rank has been due to the large and accessible deposits, good transportation facilities, good climatic conditions, and the abundance of high-grade, cheap, native white labor. Due to this condition, this state will probably be the leading producing section of America for several years to come.

In 1922, the first feldspar grinding plant in North Carolina began operations with an initial capacity of 35 tons. At present, five plants are in operation with a grinding capacity of over 400 tons daily. In a letter from the manager of one of the largest mills, he states: "Since the announcement of the acceptance of the Commercial Standard Classification, we have segregated our products accordingly

Picking belt in plant of Tennessee Mineral Products Co., Spruce Pine, N. C.

and find that we are able to produce 82 grades of feldspar and each of these to the 10 standard grindings." In the same letter, there was enclosed a list of the grades with the analyses of each.

The feldspar industry today is quite different from that of twenty years ago. In the beginning, the feldspar industry in North Carolina consisted of small operations, largely by farmers of little or no experience; small productions from mica mines and prospects; and from small feldspar prospects. The result was that the material produced was often unsatisfactory. Any shipment of feldspar contained material from several mines and prospects and, as a result, the quality was not uniform, much of the material not having been worked with proper care to remove impurities. This led to a concentration of effort and to the development of mines on a large scale. A number of miners later became their own grinders, and the grinders became miners of their own spar. As a result, systematic mining and cleaning of feldspar on a large scale has grown, producing a satisfactory material. Many of the small dikes have been abandoned, large properties have been acquired by operators, and larger bodies of feldspar have been sought and developed. The small producer has been largely forced out of business or forced to produce under contract for a larger company under its inspection. As late as 1927, the producers were comparing their product with that of other districts, especially Canada and Maine but, today, North Carolina feldspar is considered the standard.

Since feldspar is associated with quartz and mica, a "hand-cobbing" process has been practiced in this state. However, the larger companies have installed picking belts. This cuts down materially the cost of production. Now that the U. S. Bureau of Mines has announced a flotation method of sep-

Pit of Harris Clay Co., showing mining and stripping methods.

arating quartz from feldspar, in all probability the cost of production will be lowered still more. Several companies are working on dry-concentration methods which, if complete separation can be made, will lower the cost still further. The producers are looking with a great deal of interest on the results of the tests and experiments. To date, the hand-cobbing process of separation has not only been unsatisfactory but rather expensive as well.

Kyanite

The mineral kyanite ($Al_2O_3SiO_2$ or Al_2SiO_5) is known to occur at a great number of localities in North Carolina. It occurs in two chief types of deposits: disseminated in schists and in lens or boulder-like deposits. So far, the disseminated deposits offer the best advantages for development. Tests show that it can be used in a great many ceramic bodies, especially in refractory materials as spark plugs, bricks, saggers, chemicals ware, and cements. Also it may be suitable for the manufacture of porcelain ware, both the china and electrical, and for the manufacture of glass ware.

J. A. Pollard and V. L. Mattson, of Burnsville, N. C., have done considerable work to concentrate the kyanite disseminated in the schists. Results of the tests are so favorable that a small pilot mill is being built near Burnsville. The mill will produce from one to two tons of concentrates per day. If this mill proves that the kyanite can be concentrated to a grade such as the trade demands and at a price within keeping with that of other ceramic materials, the company contemplates the erection of a large plant with an initial production of 50 tons per day. The outlook for a large kyanite development in this state looks very promising at the present time.

Mica

North Carolina has long been one of the leading mica-producing sections of the United States. Due to the tariff recently placed on mica, the producers state that the production will show a considerable increase in the next few years and considerable activity is shown. Many old mines have been reopened and prove to be large producers. "Books" of mica which bring as much as $100 each are often found in these mines. In spite of this fact, mica mining is considered a hazardous financial proposition. Rich pockets give large profits to the owners but, generally speaking, these profits are wasted looking for other pockets.

The 1929 total value of mica production in this state was $241,371. It consisted of sheet, scrap and muscovite schist. Considerable prospecting has been done to determine the extent of the vermiculite deposits. Vermiculite is a form of mica that expands or exfoliates on being heated. It is used especially in insulating materials and wall board.

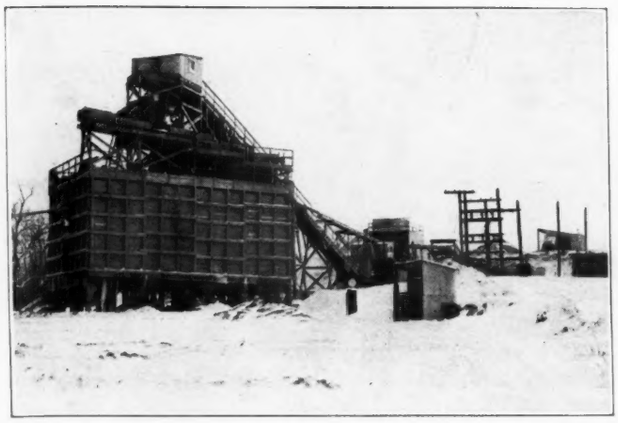
Silica

Silica, in the form of sand, gravel, quartzite and vein quartz, occurs widely distributed throughout the state. The sand and gravel that are suitable for the manufacture of glass occur chiefly in the south-central part. Examinations and analyses are being made to determine the quantity and quality of these deposits. If the results are satisfactory, in all probability, a plant will be built in the near future. Deposits of high-grade quartzite occur in Gaston, Buncombe and Transylvania Counties. Large deposits of vein quartz occur in Chatham, Moore and Montgomery Counties, as well as in many of the western counties in association with the feldspar and mica. A great deal of high-grade quartz has been shipped from the western section during the past few years. The total production of high-grade quartz or silica, in 1929, was $24,016. The total production of sand and gravel was $531,092.

Talc

There are two types of minerals mined and sold under the name of talc: pyrophyllite, the hydrous aluminum silicate, and steatite or true talc, the hydrous magnesian silicate. Large deposits of the former are found, especially in Moore and Randolph Counties, where three deposits are being worked commercially and have been so worked with few interruptions since about 1850. They are the only deposits in the United States that have been de-

(Continued on page 62)



General view of operation; hoist house in right background.

Looking from the pit toward washing and screening buildings.

Interesting Sand-Washing and Handling Methods Used at This Plant

Buffalo Company Places Two New Sand and Gravel Plants in Operation Within Year

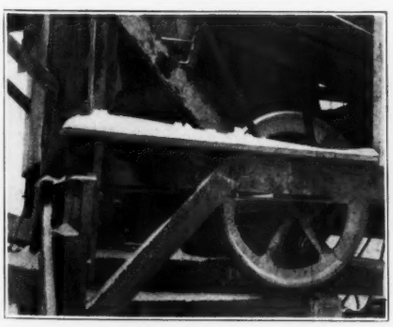
THE Clarence Sand & Gravel Co., of Buffalo, N. Y., on June 20, 1930, put into active operation its second new sand-and-gravel plant within a year. This is something of a record in this period of depression when most operators are cutting expenses wherever possible and making their old plants and equipment last just a little longer than has been customary in the past.

The new plant is located near Alexander, N. Y., and is a modern operation in every detail, with several unusual features. The most interesting of these is the method of washing the sand and gravel over a vibrating screen which separates these two products. These products are then washed separately and individually transported to the final screening plant. This plant, which has a capacity of 150 to 200 tons of washed and sized aggregate per hour, was designed by Nathan H. Sturdy, consulting engineer, of Buffalo, N. Y., and was built by the company's own forces.

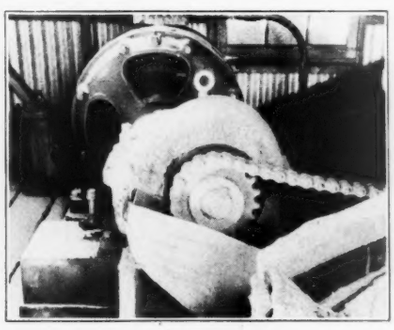
The plant was built primarily to supply aggregate for the new $12,000,000 New York state prison which is being built at Attica, N. Y., about four miles southwest of the plant. This prison will be several more years in building. Some of the product is used for highway and paving construction in the vicinity of the plant.

The plant is about 1½ miles southeast of Alexander, N. Y., which is about 35 miles east of Buffalo. The deposit, which covers the greater part of 350 acres, is in the form of a bank about 60 ft. high and is deep enough so that a face of from 100 to 125 ft. can be worked eventually. The deposit is about 50 per cent sand and 50 per cent gravel about 10 per cent of which requires crushing. The overburden, which averages less than 2 ft. in depth, is removed by a Byers Master gasoline crane equipped with an Owen 1¼-cu. yd. clamshell bucket. This is used also for handling excess material to and from stockpiles.

The gravel is excavated from the deposit by a Garst 3-cu. yd. drag scraper which discharges through a 10-in. rail grizzly to the timber plant hopper. A 30-in. belt feeder feeds the gravel from the hopper to the 24-in.-wide, 70-ft.-centers inclined belt conveyor to the scalper building. The scraper is operated by a Street Bros. Machine Works 2-drum hoist which is driven through a silent-chain drive by

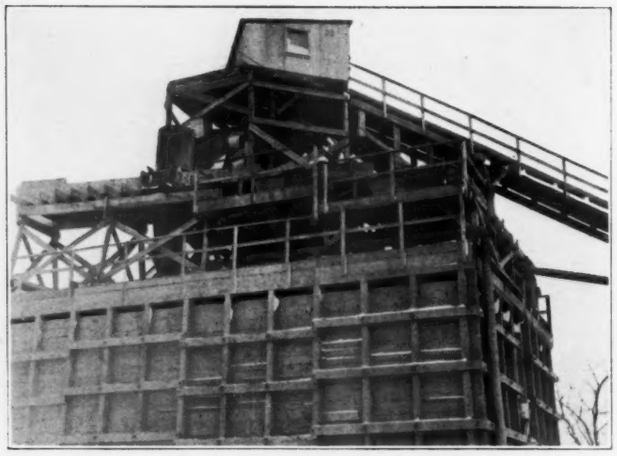


The jaw crusher used for the reduction of oversize.



Speed reducer and chain drive of one of the conveyors.

One of the water pumps which supply washing water.

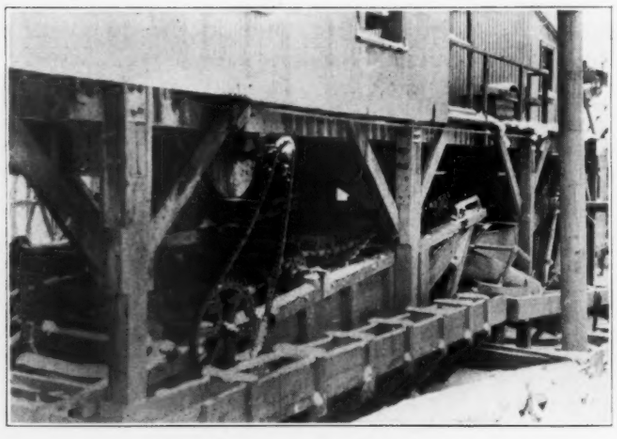


The top of the screening building, showing the sand classifier and settling tanks.

a General Electric 150-hp. motor. The belt conveyor is driven by a 15-hp. motor through a Link-Belt herringbone-gear speed reducer, and the feeder is chain-driven from the tail shaft of the conveyor.

The conveyor discharges through a chute to a Niagara 5 ft. by 8 ft. double-deck vibrating screen, which is suspended by cables from the roof trusses of the scalper building. This screen has 2½-in.-mesh wire cloth on the top deck and ¼-in.-mesh cloth on the bottom deck. The oversize material drops onto an 18-in. belt conveyor on 30-ft. centers which feeds to a Good Roads 11-in. by 26-in. Champion No. 5 jaw crusher. This discharges onto an 18-in. belt conveyor on 60-ft. centers which feeds the crushed gravel back into the plant hopper.

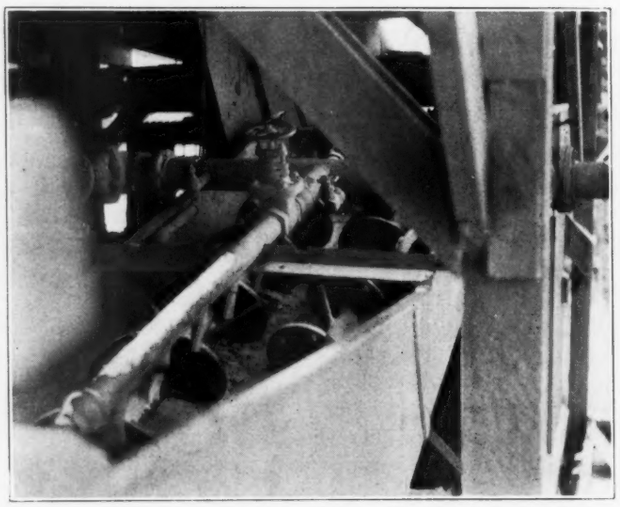
The gravel from the scalping screen discharges through a chute to a Perfect Classifier Co., Type G, 48-in. double-screw gravel washer. This discharges through a chute onto the 24-in., 175-ft.-centers main belt conveyor to the top of the screening plant. The classifier is fitted with jets for the washing water and is driven by a 15-hp. motor through a silent-chain drive. The main belt conveyor is driven by a 20-hp. motor through a Link-Belt herringbone reducer and chain. The scalping screen is Texrope driven by a 7½-hp. motor. The crusher is belt-driven by a 40-hp. motor and drives the oversize conveyor by belt from the crusher shaft. The return conveyor for the crusher is chain-driven by a 5-hp. motor.



On of the two sand-drag boxes.

The sand and water from the scalping screen go to two Good Roads 4-ft. by 18-ft. sand drag boxes arranged side by side. These have 48-in. flights spaced 12 in. apart and are chain-driven by 10-hp. motors. These discharge to a concrete sump from which an Erie 6-in. centrifugal pump feeds the sand to the screening plant where the sand, together with the gravel from the main conveyor, discharges to a steel hopper. The pump is driven by a 75-hp. variable-speed motor.

The sand and gravel discharge from the hopper onto a Niagara 4-ft. by 8-ft. double-deck vibrating screen. This has ¾-in.-mesh cloth on the top deck and ⅛-in.-mesh cloth on the bottom deck. The two larger sizes produced by this screen drop to a Niagara 4-ft. by 7-ft. triple-deck vibrating screen for further sizing. This screen has ¾-in., ½-in. and ¼-in. meshes. All the four sizes of material produced by this screen are chuted to bins. Each of the vibrating screens in Texrope driven by a 7½-hp. motor and has sprays which give the material a final washing.



A close-up view of the double-screw gravel washer.

The sand, under ⅛-in., from the first sizing screen, goes through a flume to a Link-Belt Shaw 36-in. classifier. This separates out concrete sand which is chuted to storage. The overflow goes through a split chute to two Telsmith No. 6 and two Telsmith No. 7 sand-settling tanks arranged in pairs. These produce plaster and asphalt sands and discharge directly to bins. They are also arranged so that, when desired, the discharge from one of the first pair of tanks can be made to join the discharge from the Shaw classifiers. When desired, the ¼-in. sand from the final sizing screen can also join this flow. The silt and water overflowing from the tanks are flumed to a settling pond.

The bin structure which supports the screening plant is of timber, braced with steel rods, and is mounted on structural-steel supports on concrete foundations. It has a total capacity of 1,200 tons in eight compartments which are arranged in two rows of four with four drives beneath them for truck

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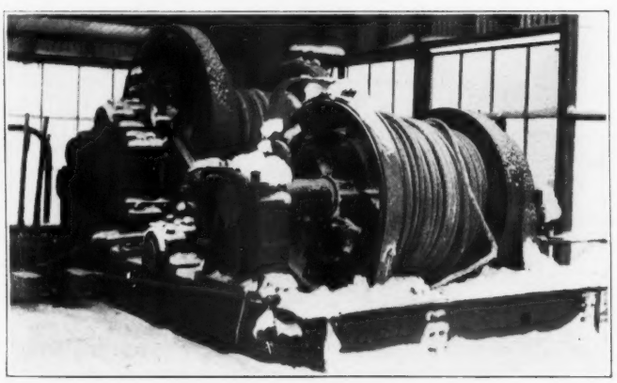
loading. The sand bins discharge through bottom gates only, and the gravel bins through both bottom and side-discharge gates. Between the two rows of large bins are four smaller bins with a total capacity of 200 tons. These can be loaded without changing the present arrangement of the sizing machinery. They will be used for car loading, if and when a siding is built to the plant, and will discharge to a car-loading conveyor for which provisions were made in the plant design. At present all shipments are made by truck and are weighed on a Buffalo 20-ton-capacity scale in a small building near the plant.

The 3-cu. yd. scraper which excavates material from the pit.

The water used for washing the sand and gravel comes from a dam a short distance from the plant. It is an earth-fill dam 240 ft. long, 25 ft. wide at the top and 110 ft. wide at the bottom, and 18 ft. high at the highest point. It was built with overburden from the deposit. A concrete spillway 20 ft. wide allows the level of the pond to be raised or lowered as desired. Concrete wings on the spillway make it practically impossible for it to be washed

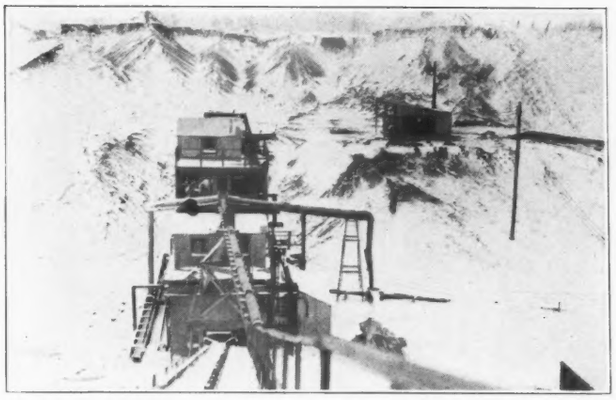


The two-drum hoist which operates the drag-scraper.

out. The dam can impound as much as 10,000,000 gal. of water.

The construction of this dam was necessary because the water supply in this locality fluctuates with the seasons and a prolonged dry spell causes a shortage of both surface and ground water. The capacity of this pond insures the plant against any possibility of a shut-down due to a shortage of water.

The water runs by gravity from the dam, through a 16-in. pipe line 1,000 ft. long, to a fresh-water sump. Any water seeping through the dam follows

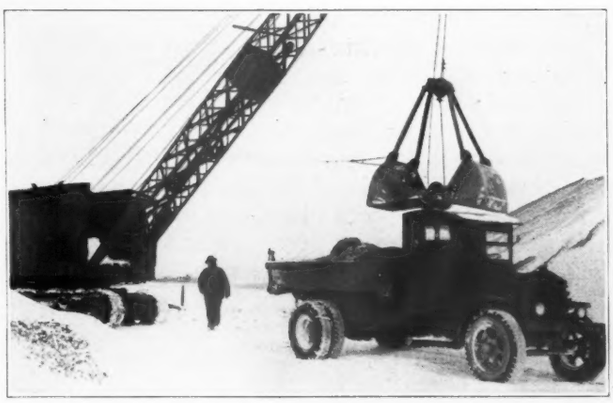


Looking from the screening building toward the pit. Washer building in foreground, hoist house at right.

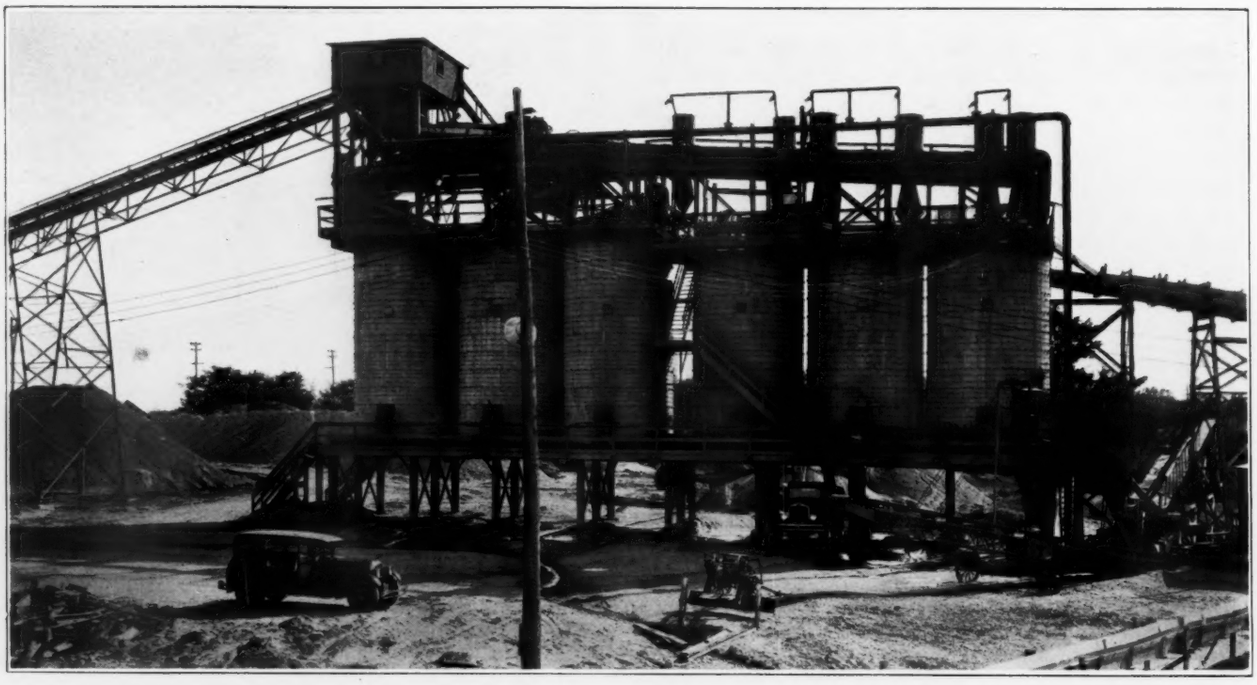
a channel into the same sump. A Union Steam Pump Co. 5-in. centrifugal pump takes the water either from the pipe line or from the sump and discharges it through an 8-in. pipe to the screening plant. A second pump of the same size and make furnishes water for the washing plant through a 10-in. pipe. A suction pipe to the settling pond also allows water to be recovered from it by the same pumps. This is generally done at night when the silt has settled out. Each of the pumps is driven by a 50-hp. motor. All pipes are inter-connected to give the utmost flexibility to the pumping system and to insure an ample supply of water even should one of the pumps break down.

The Link-Belt Co. furnished the greater part of the plant equipment including the feeder, conveyors, speed reducers, drive chains and sand classifiers. Quaker City conveyor belting is used on all conveyors and J. B. Wood flexible couplings on all motor dirves. Crane valves and fittings are used on the water lines. The plant motors are General Electric or Westinghouse with one or two exceptions. All motors except the one operating the scraper hoist are controlled from one switchboard but they may be started or stopped by push puttons located near each unit.

The main office of the Clarence Sand & Gravel Co. is at 403 Chamber of Commerce Bldg., Buffalo, N. Y. Officers are M. P. Ryley, president; and B. F. Maier, secretary. Mark H. Lewis is superintendent of the Alexander plant.



The 1¼-cu. yd. gasoline crane rehandling sized aggregate from stockpiles into truck for shipment.



A general view of the Clarence Sand & Gravel Co.'s plant at Clarence, N. Y., which was put into operation less than a year before the Alexander plant.

The company's plant at Clarence, 12 miles east of Buffalo, is similar in some respects to the Alexander plant, but it is considerably larger, having a capacity of from 200 to 250 tons per hour. Pit excavation is by power shovels loading to dump cars hauled by gasoline locomotives to the plant where they discharge to a track hopper. Some hauling is done by trucks. All plant handling of materials is done by belt conveyors. Washing and sizing of materials are done by a revolving scrubber, three vibrating screens, a screw washer, and six sand classifiers. Oversize material is crushed and returned to the main stream of material. Material is stored in six concrete stave silos and loaded by a belt conveyor equipped with an automatic weighing device.

Non-Metallic Minerals

(Continued from Page 58)

veloped in a commercial way. The pyrophyllite is found in every known deposit associated with acid phases of the volcanic tuff.

Two kinds of steatite or true talc are found; that associated with high-magnesian marbles and that associated with crystalline or basic igneous rock in which magnesian-silicate minerals are found. Talc associated with the marble occurs chiefly in Cherokee, Swain, and Madison Counties; that associated with basic rocks occurs in several of the western counties. The deposits occur as lenticular masses varying in width and depth from a few feet to one hundred feet, with lengths a great deal more. Considerable prospecting has been done in these deposits during the past year. Three mines and two mills are in operation with a possibility that a third mill will be erected soon.

The steatite talc ranks with the best produced in the world. It commands a price much better than the average talc or pyrophyllite. It is used especially in the bleachery industry, as gas tips, and in the manufacture of crayons. The total value of production during the past few years has been approximately $100,000 annually. The production this year will be a great deal more due to the new producers.

Distributed over the lower Piedmont section of the state, near the fall line, are numerous deposits of volcanic ash. Some deposits are very pure, running as high as 96 per cent silica, while others are kaolinized and may be classed as bentonic clays.

Arizona Boosts Gasoline-Tax Rate to 5 Cents; Others May Follow

With a widespread movement under way to increase gasoline taxation rates in many states, Arizona is the first state to have increased taxes by legislative action this year.

A 5-cent tax has become effective in that state, compared with a 4-cent previously. In addition to increasing the gasoline-tax rate, the new statute transfers $650,000 to the highway department from the general fund to make available, by matching federal aid highway appropriations, a total of $2,238,000 for highway work before September 1.

Increases in the rate of taxation are anticipated in other states, in many of which such proposals are before legislatures. However, opposition to unlimited increases is getting under way. The United States Good Roads Assn. has started a campaign in states whose legislatures are in session for enactment of bills providing for gasoline taxes at low rates and applications of gasoline tax revenues exclusively to roads and streets.

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MEN OF THE INDUSTRY

The portrait printed on this page in each number of PIT AND QUARRY is selected without significance as to current events or the position of the individual in the industry.

C. F. CONNELLY
Treasurer
Terre Haute Gravel Co.
Terre Haute, Ind.

Personal Mention

W. E. Barker, highway engineer, Portland Cement Assn., Chicago, addressed the Pocatello, Idaho, Chamber of Commerce on January 28. Mr. Barker stressed the wise spending of highway funds, urging that state paving programs be undertaken by the state itself rather than by the individual counties.

A. J. Rooney has been named assistant general sales manager of the Huron Portland Cement Co.

B. F. Morris, formerly general manager of the Geo. Scofield Co., Tacoma, Wash., has joined the Pioneer Sand & Gravel Co., Seattle.

Bert Koenig, of the Koch Sand & Gravel Co., Evansville, Ind., has been elected president of the Evansville park board.

C. B. Murphy has been made manager of stationary Diesel engine sales by Fairbanks, Morse & Co. with headquarters in Chicago. Mr. Murphy's experience, after he finished his schooling at Purdue University in 1911, has been almost entirely with the Fairbanks-Morse organization. For the first two years of his business career he was connected with the engineering department of the Illinois Central railroad. In 1913 he became a general line salesman in the Florida west coast territory and since the introduction of the F-M Diesel in 1915 he has devoted his time to that one product exclusively with two year's time out during the war for service in the naval aviation ground school at Minneapolis. In 1924 he was transferred to the executive offices as assistant to the manager of the Diesel-engine division and in 1929 was transferred to Washington as special representative of that division.

H. C. Beaver, formerly executive vice-president of Rolls-Royce of America, has been elected vice-president of Worthington Pump & Machinery Corp. He will devote his efforts principally to the administration of the sales department. **E. E. Yake** has been advanced to the office of vice-president to direct manufacturing and engineering. The corporation has had a most successful year, in spite of the economic conditions, having made 97 per cent of its sales quota. This quota was the same as that set for 1929.

Joah Etchells has been named to succeed the late Richard K. Meade as president of the Richard K. Meade Co., chemical and industrial engineers, Baltimore, Md. Like his predecessor, Mr. Etchells has had wide cement-mill experience, having designed a number of American plants.

Charles A. Spears, recently promoted from district representative on the Pacific coast to general supervisor of construction and governmental sales of the Caterpillar Tractor Co., has selected his staff of engineers to work on these problems.

Reading from left to right in the accompanying picture they are: **R. H. Gardner**, for the past two years district

C. A. Spears and his staff.

representative in the southeastern area for the Caterpillar Co.; **Walter Harn**, former Cleveland, O., contractor, who will be located on the Coast and cover the territory west of the Rockies; **C. A. Spears**, for nearly two years district representative on the West Coast; **Ralph J. Morgan**, and **Frank A. Nikirk.**

Louis W. Smith and **Walter Welp** are reported to be preparing to erect a crushed-stone plant near Ft. Dodge, Ia., on deposits they have acquired.

B. J. Springer has installed a crusher and pulverizer on land owned by him near Powersville, Ia., to supply agstone to farmers in that vicinity.

John L. Jackson of Saginaw, Mich., was elected president of the Sand-Lime Brick Assn. at the annual convention held February 3, 4 and 5 at Atlanta, Ga. Washington, D. C., was chosen for the 1932 convention.

Henry N. Brawner, Jr., and **James O'Donnell** were elected additional directors of the Columbia Sand & Gravel Co. of Washington, D. C., at the annual meeting of the firm held last month.

W. A. LeSueur, head of the LeSueur-Richmond Slate Corp., Richmond, Va., was elected president of the National Slate Assn. at its annual meeting held in New York, N. Y., in January. **W. S. Hays**, of Philadelphia, was reelected secretary. **R. B. Lewis** was made treasurer.

T. Schuyler Hersey has established a commercial inspecting, physical testing and chemical laboratory at Oakland, Cal. The concern is known as the Hersey Inspection Bureau.

William C. Dickerman, chairman of the board of McIntosh & Seymour Corp., has announced the retirement of **A. E. Ballin**, effective February 1, 1931, as president and director of the corporation. At a meeting of the board of directors, held February 2, **R. B. McColl** was elected president and director.

Frederick M. Strout was recently appointed sales manager for the Traylor Vibrator Co. for the territory including metropolitan Chicago, northern Illinois, Wisconsin, and Minnesota. Mr. Strout is a graduate of the Colorado School of Mines, class of '96, and has had a long association with industrial plant engineering. His office is at 1148 Builders' Bldg., Chicago, Ill.

H. W. Foulds, assistant to the president, has been placed in general charge of all sales work by Goulds Pumps, Inc., Seneca Falls, N. Y. Mr. Foulds was formerly connected with Servel, Inc., as vice-president.

J. Hansell French, district manager, announces the removal of the Philadelphia offices of Edison Cement Corp. to the Lewis Tower Bldg., 225 South 15th St.

Dr. Harold H. Steinour, analytical chemist in the research department of the Riverside Cement Co., Los Angeles, was married Jan. 29 to Miss Helen Shine of Riverside, Cal.

Obituary

Minter Cline, 67, pioneer stone operator of Bloomington, Ind., died recently in an Indianapolis hospital after a sudden heart attack. Mr. Cline was president of the Hoadley Stone Co. of Bloomington until 1926, when it was sold to the Indiana Limestone Co.

James Drennan, manager of the Utah Granite & Marble Co., Salt Lake City, died recently from a heart attack. He was 62 years old and had been identified with the company since its organization in 1914.

Samuel Hursh, 69, developer of a number of sand-and-gravel plants in the vicinity of Converse, Ind., met his death in an automobile accident recently. His son, Clyde H. Hursh, who was riding in the car when the crash came, escaped with minor injuries.

Harry Albert Hammond, for many years New York representative of the General Cable Corp., died recently. Mr. Hammond had long been connected with the Rome Wire Co. before it became a division of the General Cable Corp. and was well known through Eastern industrial circles.

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Latest Portland-Cement Statistics

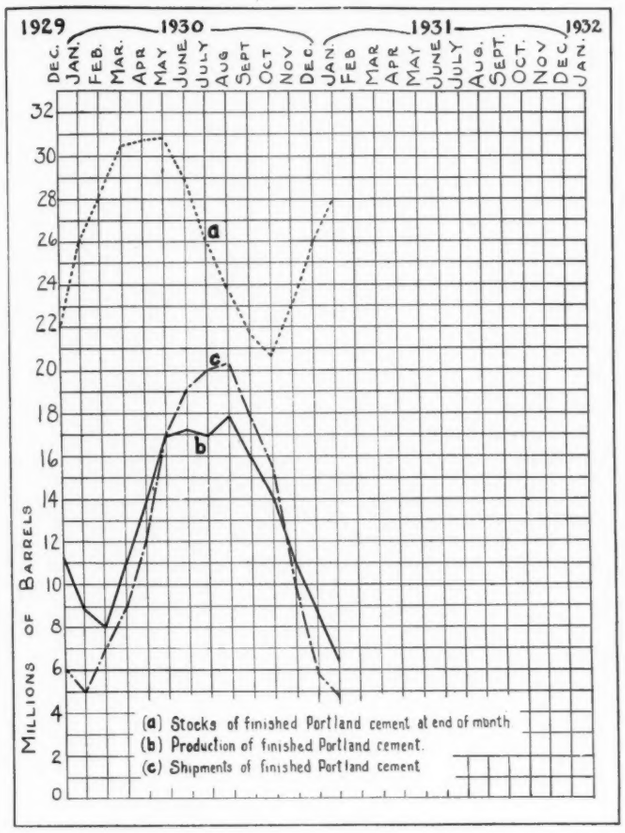

Chart showing production, shipments and stocks on hand, by months, from December, 1929, to January, 1931.

THE Portland cement industry in January, 1931, produced 6,581,000 bbl., shipped 4,687,000 bbl. from the mills, and had in stock at the end of the month 27,777,000 bbl. Production of Portland cement in January, 1931, showed a decrease of 22.6 per cent and shipments a decrease of 5.4 per cent, as compared with January, 1930. Portland cement stocks at the mills were 2.6 per cent higher than a year ago.

In the statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 165 plants both at the close of January, 1931, and of January, 1930. The estimates include increased capacity due to extensions and improvements during the period.

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES IN DECEMBER, 1930

Exported to—	Barrels	Value
Canada	2,021	$ 8,728
Central America	7,248	16,652
Cuba	3,632	9,740
Other West Indies and Bermuda	2,815	5,501
Mexico	3,871	12,562
South America	15,660	62,322
Other Countries	3,433	18,755
Total	38,680	134,260

DISTRIBUTION OF CEMENT

Shipped to—	November		December	
	1929	1930	1929	1930
Alabama	132,035	67,219	115,961	77,946
Alaska	396	158	962	142
Arizona	43,145	31,593	46,831	30,171
Arkansas	133,371	89,411	84,761	63,553
California	943,641	666,196	728,509	704,699
Colorado	32,910	41,748	32,359	19,474
Connecticut	178,005	113,957	62,419	68,997
Delaware	28,275	17,889	11,737	12,883
District of Columbia	99,047	84,931	44,485	59,861
Florida	111,127	74,271	84,792	60,233
Georgia	121,871	103,952	101,776	86,898
Hawaii	26,788	17,979	19,772	19,770
Idaho	17,468	13,538	6,642	4,829
Illinois	782,779	655,302	263,469	247,845
Indiana	326,534	160,458	108,261	80,190
Iowa	127,446	98,047	35,737	40,965
Kansas	159,803	153,458	105,763	78,186
Kentucky	107,310	102,299	46,660	54,631
Louisiana	152,054	133,845	171,845	130,600
Maine	52,865	53,127	19,014	26,759
Maryland	233,983	119,436	79,751	84,223
Massachusetts	225,482	248,481	101,340	153,583
Michigan	588,511	407,866	224,563	194,610
Minnesota	130,411	89,729	52,991	64,412
Mississippi	71,069	34,044	64,336	32,986
Missouri	396,019	413,025	142,398	188,762
Montana	16,035	20,597	8,041	9,612
Nebraska	61,548	68,717	33,088	21,890
Nevada	8,173	6,681	8,279	1,916
New Hampshire	37,526	24,958	13,915	12,673
New Jersey	678,291	403,664	281,867	259,936
New Mexico	15,557	17,445	10,437	12,929
New York	1,441,207	1,233,534	722,146	867,187
North Carolina	110,928	63,911	66,152	42,274
North Dakota	9,564	7,734	2,161	2,352
Ohio	638,120	614,013	253,060	238,538
Oklahoma	261,283	195,644	213,739	135,784
Oregon	78,363	87,098	49,698	53,936
Pennsylvania	1,022,410	517,568	435,580	431,241
Porto Rico	3,520	125	4,500	6,918
Rhode Island	58,690	34,865	24,096	20,270
South Carolina	70,756	177,632	67,813	132,992
South Dakota	22,438	17,948	12,744	7,187
Tennessee	228,476	117,871	136,191	74,077
Texas	475,332	454,199	428,688	339,964
Utah	37,616	21,142	23,560	4,271
Vermont	43,012	21,939	17,560	2,678
Virginia	120,589	102,029	68,406	77,370
Washington	158,675	262,159	101,062	185,135
West Virginia	103,156	105,304	50,471	56,245
Wisconsin	224,480	157,633	80,278	62,793
Wyoming	9,346	8,763	6,690	3,028
Unspecified	.....	13,633	.....	427
	11,157,436	8,748,765	5,877,356	5,650,831
Foreign countries	64,564	35,235	73,644	37,169
Total shipped from cement plants	11,222,000	8,784,000	5,951,000	5,688,000

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES AND BY DISTRICTS, IN DECEMBER, 1930

Imported from—	District into which imported	Barrels	Value
Belgium	New York	12,580	$11,779
	Porto Rico	1,319	1,676
	Total	13,999	13,455
Canada	Maine and New Hampshire	22	101
	Porto Rico	3,036	3 397
	Total	3,058	3,498
Denmark	Porto Rico	15,382	23,926
France	Massachusetts	362	2 087
Germany	Los Angeles	2,517	4,993
Italy	New York	1	2
Japan	Hawaii	7,425	9,786
	Los Angeles	1	4
	Total	7,426	9,790
United Kingdom	New York	1,012	1,890
	Grand Total	44,157	59 611

RELATION OF PRODUCTION TO CAPACITY

	January		December	November	October
	1930 (*per cent*)	1931 (*per cent*)	1930 (*per cent*)	1930 (*per cent*)	1930 (*per cent*)
The month	38.8	29.5	38.2	51.7	65.4
The 12 months ended	65.5	60.6	61.5	62.6	64.2

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1930 AND 1931 *(In thousands of barrels)*

Month	Production		Shipments		Stocks at End of Month	
	1930	1931	1930	1931	1930	1931
January	8,498	6,581	4,955	4,687	27,081	27,777
February	8,162	.....	7,012	.....	28,249	.....
March	11,225	.....	8,826	.....	30,648	.....
April	13,521	.....	13,340	.....	30,867	.....
May	17,249	.....	17,224	.....	30,891	.....
June	17,239	.....	18,781	.....	29,364	.....
July	17,078	.....	20,153	.....	26,289	.....
August	17,821	.....	20,299	.....	23,824	.....
September	16,124	.....	18,083	.....	21,889	.....
October	14,410	.....	15,599	.....	20,697	.....
November	11,098	.....	8,784	.....	23,056	.....
December	8,480	.....	5,688	.....	†25,883	.....
Totals	160,905	.....	158,744	.....	.....	.....

PRODUCTION AND STOCKS OF CLINKER, BY DISTRICTS, IN JANUARY 1930 AND 1931 *(In thousands of barrels)*

District	Production		Stocks at End of Month	
	1930	1931	1930	1931
Eastern Pa., N. J., and Md.	2,546	1,878	1,356	1,329
New York and Maine	525	659	813	902
Ohio, Western Pa., and W. Va.	999	723	1,212	1,290
Michigan	868	445	1,152	1,271
Wis., Ill., Ind., and Ky.	1,586	1,000	858	1,091
Va., Tenn., Ala., Ga., Fla., and La.	901	587	732	966
Eastern Mo., Ia., Minn. and S. Dak.	790	898	575	584
W. Mo., Nebr., Kans., Okla. and Ark.	805	550	290	666
Texas	400	315	563	339
Colo., Mont., Utah, Wyo., and Idaho	11	128	254	276
California	926	686	1,315	1,177
Oreg. and Wash.	147	259	526	509
Totals	10,504	8,129	9,646	10,400

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN JANUARY 1930 AND 1931, AND STOCKS IN DECEMBER, 1930 *(In thousands of barrels)*

District	January						Stocks at End of December
	Production		Shipments		Stocks at End of Month		
	1930	1931	1930	1931	1930	1931	1930
Eastern Pa., N. J., and Md.	2,286	1,617	1,388	1,084	6,075	5,546	5,014
New York and Maine	320	420	249	206	1,615	1,988	1,755
Ohio, Western Pa., and W. Va.	727	505	472	367	3,289	3,710	3,572
Michigan	346	45	234	220	2,509	2,915	3,090
Wis., Ill., Ind., and Ky.	1,377	804	327	354	3,926	3,955	3,505
Va., Tenn., Ala., Ga., Fla., and La.	842	646	730	679	1,753	1,766	1,799
Eastern Mo., Ia., Minn. and S. Dak.	758	854	214	288	3,140	3,069	2,503
W. Mo., Nebr., Kans., Okla. and Ark.	701	450	271	321	1,889	2,218	2,089
Texas	321	322	317	340	817	782	799
Colo., Mont., Utah, Wyo., and Idaho	0	123	42	50	415	410	337
California	718	624	640	643	1,168	858	876
Oreg. and Wash.	102	171	71	135	485	560	524
Totals	8,498	6,581	4,955	4,687	27,081	27,777	25,883

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1929 AND 1930

Month	Exports				Imports			
	1929		1930		1929		1930	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
January	78,639	$283,002	82,387	$293,135	151,302	$177,976	201,609	$207,461
February	58,886	225,590	64,267	217,798	118,930	123,123	114,455	119,717
March	69,079	235,164	117,563	357,896	131,909	112,788	43,622	59,981
April	64,145	218,316	57,419	200,217	89,668	114,281	140,871	178,226
May	57,955	219,366	57,423	198,170	200,646	267,854	94,696	111,998
June	96,055	287,612	82,077	223,639	203,545	228,170	55,356	74,370
July	71,992	247,177	47,082	166,577	182,098	199,960	12,404	20,973
August	60,013	225,762	49,031	167,579	183,938	199,403	35,323	39,029
September	86,268	308,631	46,594	153,384	112,372	152,239	51,096	59,721
October	101,359	337,839	62,690	190,305	172,566	187,504	75,284	84,364
November	53,378	198,197	50,495	151,555	96,568	95,844	109,124	125,448
December	88,403	297,255	38,680	134,260	84,358	79,098	44,157	59,641
Totals	886,172	3,083,911	755,708	2,454,515	1,727,900	1,938,240	977,997	1,140,929

Research on Testing Sieves Reported at Vienna Engineers Meeting

A TECHNICAL committee, under the auspices of the International Standards Assn., of which the American Standards Assn. is a member, has conducted research with sieves. The progress of this work, which was entrusted to the Polish Standards Assn., was discussed in September, 1930, at a meeting in Vienna, with special interest in "testing" sieves.

It was agreed that testing sieves would be defined as sieves used for testing the fineness of the material to be sifted, but not as sieves used for testing the working sieves. Although the testing sieves and the working sieves are required to have the same width of mesh, the conference agreed that the wire diameter of a working sieve and the corresponding testing sieve need not be the same. It appeared that, in Germany, test sieves were frequently used as working sieves because of their greater accuracy, as the price of testing sieves is not very greatly above that of working sieves.

With regard to wire diameter it was proposed to investigate whether it would be possible within certain limits to use the same wire diameter for a number of consecutive sieve sizes.

The discussion resulted in agreement that the width of mesh should be considered as the basic feature of the sieve, and not the number of meshes per unit of length or area. The German delegate, Mr. Gramenz, made the following interesting statement with regard to experiments carried out in Germany to determine the influence of deviations of the actual width of the meshes from their nominal size:

"The most important characteristic feature of sieve cloth is the width of mesh. For a given width of mesh, the wire diameter has no influence or only a very slight one, on the effect of the sieve. The unavoidable errors in the sizes of the meshes—usually designated as 'false meshes'—have an important influence on the sieve performance. Comparative sifting tests have shown that a single false mesh showing a variation from the nominal size of 51 per cent reduced the oversize, obtained during a ten-minutes' sifting period, from 20 to about 9 per cent. Other experiments in which a sieve without 'false meshes' gave an oversize of 14 per cent, during a ten-minutes' sifting period, showed that the oversize was reduced to 9 per cent by the presence of two false meshes with an error of 25 per cent; and to 4 per

(Continued on Page 81)

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Coming Events

Feb. 22-28, 1931, Cleveland, O. Congress and exposition under the sponsorship of the American Ceramic Society and in coöperation with the American Refractories Institute, the National Brick Manufacturers' Assn., the Chicago World's Fair Ceramic Assn., the Grinding Wheel Manufacturers' Assn. and the Feldspar Grinders' Institute. All meetings in Cleveland Auditorium. Exhibits in Cleveland, Statler and Hollenden Hotels.

Feb. 24-26, 1931, Milwaukee, Wis. Annual Convention, American Concrete Institute, Schroeder Hotel. Joint sessions with Concrete Masonry Assn. and Wisconsin Concrete Products Assn. Harvey Whipple, secy., 2970 W. Grand Blvd., Detroit, Mich.

Feb. 24-27, 1931, Wichita, Kan. Sixth Annual Southwest Road Show and School, Exposition Building. F. G. Wieland, manager, P. O. Box 1043, Wichita, Kan.

March 10, 1930. Washington, D. C. Regional safety conference of Portland-cement plants in Portland Cement Assn. group. Hotel Raleigh. W. M. Powell, Medusa Portland Cement Co., York, Pa., chairman.

March 19, 1930. Kansas City, Mo. Regional safety conference of Portland-cement plants in Portland Cement Assn. group. K. C. Athletic Club. C. M. Carman, Universal Atlas Cement Co., Independence, Kan., chairman.

April 2, 1930. Davenport, Ia. Regional safety conference of Portland-cement plants in Portland Cement Assn. group. Hotel Blackhawk. H. F. Tyler, Dewey Portland Cement Co., Davenport, Ia., chairman.

April 14, 1930. Albany, N. Y. Regional safety conference of Portland-cement plants in Portland Cement Assn. group. Hotel Ten Eyck.

April 17, 1930. Pittsburgh, Pa. Regional safety conference of Portland-cement plants in Portland Cement Assn. group. William Penn Hotel.

April 13-18, 1931. Cleveland, O. National Industrial Equipment Exposition, in connection with Congress on management, maintenance and materials-handling of A. S. M. E. G. E. Pfisterer, managing director, 308 W. Washington St., Chicago, Ill.

May 4, 1931. New York, N. Y. Thirteenth exposition of Chemical Industries, Grand Central Palace. International Exposition Co., managers, Grand Central Palace, New York.

June 3-4, 1931, White Sulphur Springs, W. Va. Thirteenth annual convention, National Lime Assn., Greenbrier Hotel. Norman G. Hough, president and general manager, 927 15th St., N. W., Washington, D. C.

Pumpings from the Old Pit

Excerpts from the old files of PIT AND QUARRY *reveal many interesting sidelights on the activities of the pits, quarries and plants of former days. These, interesting by comparison with practices in vogue today, are printed in this column each issue.*

Fourteen Years Ago

THE plant of the Western Indiana Gravel Co. at Lafayette, Ind., was described, by Frank M. Welch and Miner Raymond, as probably the largest sand-and-gravel plant in the industry without bin storage except for small hoppers which hold only enough to allow shifting of cars. Its capacity was 2,500 cu. yd. in a 10-hr. shift. M. A. Neville was president and general manager, and F. D. Coppock was vice-president and assistant manager of the operation.

* * *

The following officers were elected by the F. W. Menke Stone & Lime Co., Quincy, Ill.:

G. W. Menke, president; D. F. Metzger, secretary; and F. C. Menke, treasurer.

Ten Years Ago

S. D. ORMSBY and M. J. Davis who, in June, 1920, incorporated the Watertown Stone Products Co., had just completed a crushing plant and had opened a quarry at Watertown, N. Y. Most of the crushing, elevating and screening equipment was furnished by Good Roads Machinery Co. Crushed stone was being shipped by both rail and truck.

* * *

The Ohio Sand & Gravel Producers Assn. held a meeting at Columbus and elected the following officers for the ensuing year: Fred Hall, Cincinnati, president; E. A. Evans, Janesville, vice-president; and T. C. Fuller, Portsmouth, secretary-treasurer. V. O. Johnson, president of the national association, discussed "Activities in 1920 and 1921," and E. Guy Sutton, executive secretary of the same association, spoke upon "Freight Rates and Priority Orders." R. H. Smith, Urbana, read a paper entitled "The Construction and Maintenance of County Roads."

* * *

At its annual meeting in Chicago, the Illinois Sand & Gravel Producers Assn. amended its constitution to include stone producers and changed the name to Illinois Concrete Aggregate Assn. M. B. Schaff was president.

* * *

Five Years Ago

THE first part of a comprehensive article by C. H. Sonntag, entitled "Compressed Air and Air Compressors," was a technical discussion of air compression.

* * *

A. B. Mack, assistant general manager, Kelley Island Lime & Transport Co., in a paper read at the recent convention of the National Crushed Stone Assn., discussed the human element in plant operations. He emphasized the value of confidence, justice and truthfulness in the relationships between managers and workmen.

* * *

J. R. Collins was president and Miss Rose Collins was secretary of the Spruce Pine Sand & Gravel Co. which operated a plant 25 mi. south of Muscle Shoals, in Alabama. In addition to an excellent and large deposit of sand and gravel, the property contained exceptionally good clay and iron ore.

* * *

The Zenith Limestone Co. operated a plant of the side-hill type at Lost City, Okla. The ledge of rock was 50 ft. thick and averaged 88 per cent calcium carbonate, according to H. W. Munday. The plant was completely electrified. L. V. Gray was president.

Ready-Mixed Firm Gets Seattle Building Award

The Pioneer Sand & Gravel Co., operating a ready-mixed concrete plant at Seattle, Wash., was recently awarded a contract to supply 12,500 cu. yd. of the material for use in constructing the New City Light Bldg. in downtown Seattle.

Constructs Continuous Kiln for Burning Brick

Keen interest is being shown in trade quarters in the new process of Harbison-Walker Refractories Co. The company has constructed a continuous kiln for burning silica brick. It is to be operated under a German patent for which the Harbison concern controls exclusive American rights. According to those close to the organization, the new process is likely to result in a substantial reduction in operating costs.

Financial News

The information contained in these financial pages is given with the understanding that any statement on the part of this magazine or any of its staff, as to the responsibility or standing of any person, firm or corporation, or as to the value of any property or securities is a mere expression of opinion, given as a matter of service to the readers of PIT AND QUARRY, *for which no responsibility in any way is to attach to this magazine or to any of its staff.*

International Earnings Close to Total in 1929

Preliminary statement of International Cement Corp. for the year ended December 31, 1930, shows net income of $4,527,744 after depreciation, interest and reserve for federal taxes and contingencies, equivalent to $7.12 a share on 635,798 no-par shares of capital stock. This compares with $4,950,433 or $7.88 a share on 627,865 shares in 1929.

Net income for the fourth quarter of 1930 was $1,080,978 after charges, equal to $1.70 a share on 635,798 shares comparing with $1,395,003 or $2.20 a share on 633,452 shares in preceding quarter and $1,381,467 or $2 20 a share on 627,865 shares in the December quarter of the previous year.

The preliminary statement for year 1930, compares as follows:

	1930	*1929
Gross	$33,459,887	$28,790,869
Costs, expenses, depreciation, etc.	27,066,883	22,169,943
Balance	$6,393,004	$6,620,926
Interest, Federal taxes, etc.	1,865,260	1,670,493
Net income	$4,527,744	$4,950,433

*Actual earnings.

Asbestos Corporation's Operations Entail Loss

At a meeting of first-mortgage bondholders of Asbestos Corp., Colonel Robert F. Massie stated that, for the fiscal year ended December 31, 1930, Asbestos Corp. would show a loss of $1,229,000 after all charges, including provision for development work, bond interest write-offs and $300,000 for depreciation.

At end of 1929, he pointed out, the company had a surplus of approximately $148,000. During year adjustments were made, bringing up the total to around $241,000. The company's loss from operations before provision for developments, interest and other charges, was $52,800. There was appropriated $389,000 for development work, $100,000 as the year's share of write-offs from the book value of fixed assets, $546,000 for bond interest and $300,000 for depreciation, making a loss for the year, after adding sundry earnings and deducting all charges, of $1,229,000. Colonel Massie explained that figures submitted were only approximations and were subject to audit and to checking by the directors.

C. E. McCuaig, a member of the general-mortgage bondholders committee, charged that, as of the end of November last, working capital had been reduced to $800,000.

Mr. McCuaig said he had enough mortgage bonds to block the postponement of first-mortgage-bond interest, which was being asked at the meeting, and asked for postponement of the meeting for one month to enable consideration to be given to a change in management.

The bondholders protective committee insisted that the matter be put to a vote, and Mr. McCuaig then stated he would vote in favor of postponement to enable the extraordinary resolution to pass. A total of $1,563,900 bonds were voted in favor for postponement of interest payment, which was due January 1 last, to July 1 or more than 65 per cent of $2,361,000 outstanding.

Decline in company's shipments for entire year 1930 from 1929, Colonel Massie said, was 40 per cent in tonnage and 50 per cent in value.

Penn.-Dixie Cement Corp. Shows Increased Profit

The report of Pennsylvania Dixie Cement Corp. and subsidiaries for year ended December 31, 1930, shows net profit of $587,461 after depreciation, depletion, interest, federal taxes, etc., equivalent to $4.32 a share on 135,888 shares (par $100) of preferred 7-per cent stock, on which no dividends have been paid since September 15, 1929. This compares with $332,268, or $2.44 a share, on the preferred stock in 1929.

The consolidated income account for year 1930 compares as follows:

	1930	1929
Net sales	$8,625,170	$9,610,646
Exp. (less other income)	5,884,560	7,113,989
Balance	$2,740,610	$2,496,657
Depr. and depl.	1,379,289	1,395,916
Interest	669,376	706,175
Federal taxes	104,484	62,298
Net Profit	$587,461	$332,268
Pfd. dividends	.....	711,574
Surplus	$587,461	*$379,306
Profit and loss surplus	2,598,061	1,936,158

*Deficit.

During the year the company improved its current position. On December 31 last, net current assets totaled $6,119,222, as compared with $5,591,340 in 1929, a gain of $527,880. Current assets last year, increased to $6,711,196 from $6,276,194 in 1929, while current liabilities declined to $591,974 from $684,854. Cash and marketable securities totaled $3,425,802, a gain of $438,554. Surplus increased by $661,903 to $2,598,061.

Consolidated balance sheet as of December 31, 1930, compares as follows:

Assets

	1930	1929
Land, bldgs., equipment	$24,352,433	$25,140,835
Cash	3,323,803	2,987,264
Market securities	102,000	.....
Notes and accounts receivable	466,285	686,512
Inventories	2,819,108	2,602,418
Misc. invest.	346,445	372,964
Ins. fund	186,409	41,230
Deferred charges	24,606	37,782
Total	$31,621,089	$31,869,005

Liabilities

Pfd. stock	$13,588,800	$13,588,800
Com. stock	4,000,000	4,000,000
Gold bonds	10,742,500	11,564,000
Accts. payable	119,478	206,449
Accrued taxes, interest, etc.	293,537	379,639
Fed. tax reserves	178,959	98,767
Other reserves	99,754	95,192
Surplus	2,598,061	1,936,158
Total	$31,621,089	$31,869,005

CURRENT DIVIDENDS

COMPANY	CLASS OF STOCK	DIVIDEND RATE	HOLDERS OF RECORD	PAYABLE
Bessemer Limestone & Cement	Class A	$0.75 qr.	Jan. 20	Feb. 1
Calaveras Cement	7% Pfd.	1¾% qr.	Dec. 30	Jan. 15
Cleveland Quarries	Common	$0.75 qr.	Feb. 14	Mar. 1
Cleveland Quarries	Common	$0.75 extra	Feb. 14	Mar. 1
Consolidated Sand & Gravel	Preferred	$1.75 qr.	Jan. 31	Feb. 16
Construction Materials	Preferred	$0.87½ qr.	Jan. 20	Feb. 1
Dow Chemical	Common	$0.50 qr.	Feb. 2	Feb. 16
Fitzsimmons-Connell Dredge & Dock	Common	$0.50 qr.	Feb. 20	Mar. 1
General Refractories	Common	$1.00 qr.	Feb. 10	Feb. 25
Great Lakes Dredge & Dock	Common	$0.25 qr.	Feb. 5	Feb. 14
Great Lakes Dredge & Dock	Extra	$0.25 qr.	Feb. 5	Feb. 14
Illinois Brick	.....	$0.60 qr.	Jan. 2	Jan. 15
Johns Manville	Common	$0.75 qr.	Dec. 25	Jan. 15
Kentucky Consolidated Stone	Preferred	$1.75 qr.	Jan. 15	Feb. 1
Lehigh Portland Cement	Preferred	$1.75 qr.	Mar.14	Apr. 1
Material Service	Common	$0.50 qr.	Feb. 15	Mar. 1
McNeel Marble	Preferred	$1.50 qr.	.....	Jan. 15
McWilliams Dredging	Common	$0.37½ qr.	Feb. 20	Mar. 1
Mineral Products	Preferred	$0.17½ qr.	Jan. 31	Feb. 2
Missouri Portland Cement	Common	$0.50 qr.	Jan. 22	Jan. 31
Owens-Illinois Glass	Preferred	$1.50 qr.	Mar.16	Apr. 1
Pacific Clay Products	Common	$0.60 qr.	Jan. 20	Feb. 1
Pennsylvania Salt	Common	$1.25 qr.	Dec. 30	Jan. 15
Raymond Concrete Pile	Preferred	$0.75 qr.	Jan. 20	Feb. 1
Raymond Concrete Pile	Common	$0.50 qr.	Jan. 20	Feb. 1
Riverside Cement Co	Preferred	$1.50 qr.	Jan. 15	Feb. 1
Riverside Cement Co	Class A	$0.15 qr.	Jan. 15	Feb. 1
Standard Paving & Materials	Preferred	$1.75 qr.	Jan. 31	Feb. 16
Standard Paving & Materials	Common	$0.50 qr.	Jan. 31	Feb. 16
Superior Portland Cement	Class A	$0.27½M	Feb. 21	Mar. 1
U. S. Gypsum Co	Preferred	$1.75 qr.	Mar.14	Mar.31
U. S. Gypsum Co	Common	$0.40 qr.	Mar.14	Mar.31
Worcester Salt	Preferred	$1.50 qr.	Feb. 7	Feb. 15

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Traffic News and Comment

Recent I. C. C. Decisions

The commission has found the rates on crushed stone and slag, mixed and coated with asphaltum and lime, from Smyth, N. C., Atlanta, Ga., Birmingham, Ala., and High Bridge, Ky., and on sand, gravel and chert, mixed and coated with asphaltum, oil or tar, from Ormewood, Ga., to destinations in Southern territory, unreasonable. Reasonable rates will not exceed a prescribed scale, and are to be established not later than April 28. The scale begins with a rate of 75c for single-line hauls and 95c per ton for joint-line hauls. The rate for both single and joint hauls for 100 miles is $1.60 per ton, for 200 miles is $2, for 300 miles is $2.30, for 400 miles is $2.60, for 500 miles is $3.10, for 600 miles is $3.30, for 700 miles is $3.80, for 800 miles is $4, for 900 miles is $4.30, and for 1,000 miles is $4.50. This scale applies to Southern territory except the peninsula of Florida to which an arbitrary scale has been added, beginning with 30 cents for hauls of 30 miles or less and allowing 95 cents for distances exceeding 350 miles. I. C. C. Docket No. 22,261, Interstate Amiesite Co. et al. v. A. & R. et al.

Rate-Committee Dockets

NEW ENGLAND ASSN.

To equalize rates from competitive points shippers are asking that the rate on screened gravel from North Wilbraham, Mass., to Athol, Mass., be reduced from $1.05 per net ton to 90 cents, c. l. min. wt.[1] Docket No. 21,689.

TRUNK LINE ASSN.

Lime and Limestone

Shippers are asking that the Reading Co. add to its tariffs, I. C. C. Nos. 6, 8, 861, 864, 875, 890, 891, 892, 1,009, J8,664 and J8,768, applying on lime (building, hydrated building, land, chemical and hydrated chemical), c. l. min. wt. 30,000 lb., and limestone (finely ground), c. l. min. wt. 50,000 lb., to points in Trunk Line territory: Exton, Pa., as a point of origin, taking the same rates and min. c. l. wt., as applicable from Mill Lane, Pa. Docket No. 25,833.

Plasterboard

Finding that there is a combination of local rates on plasterboard making a through rate 18½c per 100 lb., from Oakfield, N. Y., to Niagara Falls, Ont., c. l. min. wt. 40,000 lb., shippers have asked that this rate be published as a through rate. The present published through rate is 21½c. Docket No. 25,953.

Sand and Gravel

Reductions in the rates on sand and gravel to meet motor truck competition are proposed in two dockets. In No. 25,880, a rate of 70c per net ton on sand and gravel other than blast, engine, glass, moulding or foundry, quartz, silex and silica, c. l. min. wt. 90 per cent of the capacity of the car, from Port Covington (Baltimore), Md., to Glen Morris, Md., is proposed to replace the present rate of 90c. In No. 25,890 a rate of 70c on sand and gravel of the same description and c. l. min. wt. from Baltimore and Patapsco, Md., to Parkton, Md., is proposed to replace the present rate of 90c.

CENTRAL FREIGHT ASSN.

Crushed Stone

Reductions in the rates on crushed stone, c. l. min. wt.,[1] are asked by shippers at Albany and Carpenter, Ohio, to various destinations on the Ohio Div. of the N. Y. C. Ry. Representative rates in Docket No. 27,473 are:

To	Proposed	Present
Shawnee, O.	$0.80	$0.90
Glouster, O.	0.70	0.80
Armitage, O.	0.60	0.70
Hobson, O.	0.65	0.70
Pomeroy, O.	0.70	0.80
Gallipolis, O.	0.80	0.80
Pt. Pleasant, W. Va.	0.80	0.90
Nitro, W. Va.	0.90	1.25
Charleston, W. Va.	1.00	1.25
Swiss, W. Va.	1.20	1.60

Lime

A reduction in the rate on hydrated lime from Indianapolis, (Speedway), Ind., to Peoria and Pekin, Ill., is sought by shippers. The present rate is 21c (sixth class) and the proposed rate 14½c c. l. min. wt. 30,000 lb. Docket No. 27,464.

Stone

Shippers are seeking the establishment of a rate on stone, viz.: quarry waste or tailings, c. l. min. wt.[1], from Keeport, Ind., to Gibsonburg, Ohio, of $1.20 per net ton of 2,000 lb. Route via Wabash, Toledo, P. R. R. The present rate is 20½c per 100 lb. Docket No. 27,449.

ILLINOIS FREIGHT ASSN.

Sand and Cement

It is proposed to establish a rate on sand and cement, mixed in bags, straight c. l. from Chicago, Ill., to Oklahoma City, Okla., of 22c. The present rate is 65c. Docket No. 5,000 Sub. C-21.

A reduction in the rate on sand and cement, mixed, from Chicago, Ill., to St. Louis, Mo., c. l. min. wt. 40,000 lb., is proposed. The present rate on sand is 16c and on cement is 14½c, and the proposed rate on the mixture is 12½c. Docket No. 6,084.

SOUTHERN FREIGHT ASSN.

Lime

Carriers propose to amend Agent Glenn's Alabama Commodity Tariff 16-C, rate table 24, page 98, by revising rates on lime, carloads, between Manistee & Repton R. R. stations and all points in Alabama, covered by the above tariff (intrastate) to basis of trunk-line scales. This will result in reductions.

WESTERN T. L. COMMITTEE

Cement

In place of the present class or combination rates on cement from Speeds, Ind., to all points in Iowa and Missouri, also Missouri River Points, Kansas City, Mo., to Sioux City, Ia., inclusive, it is proposed to publish commodity rates based on the scale in I. C. C. Docket No. 8,182. Docket No. 7,517.

At present there are no specific rates in effect on cement from Manitowoc, Wis., to stations in Minnesota except to points in southeastern Minnesota, St. Paul, Duluth, and a few adjacent points as set forth in W. T. L. Tariff No. 132-G. It is proposed that rates be established based on the scale prescribed in I. C. C. Docket No. 8, 182; specific rates to be subsequently checked out and published in zone 2 points using short-line distances figured over not to exceed three lines, and west of zone 2 specific rates constructed 3½c per 100 lb. over rates from Mason City, this arbitrary being the difference in the rates from Manitowoc to St. Paul and Mason City to St. Paul. Docket No. 4,061-B.

Crushed Stone

At present the rates on crushed stone from stations in Illinois to destinations in Iowa are on various bases, and the min. c. l. weights are not uniform. Shippers are proposing that these rates be published on the basis of the scale in I. C. C. Docket 21,755 (sand and gravel scale), and that the c. l. min. wt. be the market capacity of the car. Docket No. 6,952-A.

Plaster

At present rates are published on plaster c. l. min. wt. 40,000 lb., and 60,000 lb. It is proposed that rates be established on plaster and articles taking same rates as named in Item 23 of W. T. L. Tariff 29-K, I. C. C. A-2,063, c. l. min. wt. 80,000 lb., from Ft. Dodge, Gypsum, Kalo and Mineral City (Gypsum), Ia., to representative points. A complete copy of the exhibit will be furnished on request. Representative rates are: to Benson, Ill., on 40,000 lb., 18½c, on 60,000 lb., 17c, and the proposed rate on 80,000 lb., 14½c; to Washington and Pekin, Ill., on 40,000 lb., 18c, on 60,000 lb., 16½c, and the proposed rate on 80,000 lb., 14½c. Docket No. 4,061-B.

SOUTHWESTERN BUREAU

Cement

Commodity rates are proposed based on Scale 3, I. C. C. Docket 15,151, on cement, carloads, description and minimum weight as per S. W. L. Tariff 168-A, also masonry cement, carloads,

from New Braunfels, Longhorn, Cementville, Houston, Harrys, Eagle Ford and other Texas cement-producing points as per the above tariff to St. Louis-Kansas City territory, as described in S. W. L. Territorial Directory 1-H, also all points in Oklahoma. The rates on cement from Texas to the destinations in the above territory are extremely limited, as a general rule, the class rates being applicable. Scale 3, I. C. C. Docket 15,151, is published from points in Oklahoma to Louisiana and is also authorized from the Southeast to certain points in Louisiana. It is also applicable from Harrys, Houston and Eagle Ford to points in Louisiana and Arkansas, and it is stated there should be no objection to its application from Texas producing points to Oklahoma, Kansas and Missouri. Docket No. 22,210.

It is proposed to establish cement scale 3 rates, I. C. C. Docket 8,182, on masonry cement, c. l. min. wt. 50,000 lb. Except when the marked capacity of the car used is less, the actual weight, but not less than 40,000 lb., will apply, from New Braunfels, Tex., to Kansas City and Excelsior Springs, Mo.; 29½c per 100 lb. to Kansas City, Mo., based on a distance of 743.1 miles via M. K. T., Dallas, T. & N. O., Denison and M. K. T. lines; 30c per 100 lb. to Excelsior Springs, Mo., based on a distance of 781.5 miles via I. G. N., Georgetown, M. K. T., Kansas City, C. M. St. P. & P. It is stated that masonry cement resembles portland cement both chemically and physically and is packed in three-ply multi-wall paper bags containing 50 lb. of cement. The present value f. o. b. cars in New Braunfels is $18 per ton, which includes the value of the sacks, and being approximately the value of portland cement. It will load approximately the same as portland cement. Docket No. 22,139.

TRANS-CONTINENTAL

Shippers request that Item 1,743, Tariffs 1-I (I. C. C. Nos. 136, A-296, 2,332 and 1,246 of Frank Van Ummersen, W. S. Curlett, B. T. Jones, and H. G. Toll, agents, respectively), and 4-F (I. C. C. Nos. 137, A-300, 2,347 and 1,249 of Frank Van Ummersen, W. S. Curlett, B. T. Jones and H. G. Toll, agents, respectively), be amended to permit stopping-in-transit to partly unload. Docket No. 11,986.

[1] The proposed carload minimum weight will be 90 per cent of the marked capacity of the car except, when car is loaded to full cubical or visible capacity, actual weight will apply.

BUILDING MATERIAL PRICES, JANUARY 1, 1931

Data collected by the Bureau of the Census and prepared by the Division of Building and Housing, U. S. Bureau of Standards.

City	Portland Cement (bbl.)	Gypsum Plaster (tons)	Gypsum Plaster Board (1,000 sq. ft.)	Lime (tons)	Building Sand (cu. yd.)	Crushed Stone (tons)	Roofing Slate (100 sq. ft.)
Akron, O.	$2.67	.....	.....	$18.00	$1.85	$2.75	.....
Albany, N. Y.	2.97	$17.10	$24.75	18.00	.....	.....	.....
Atlanta, Ga.	2.38	16.50	.....	17.50	1.85	2.30	.....
Baltimore, Md.	2.53	16.00	.....	13.00	2.50	2.75	$10.00
Buffalo, N. Y.	2.95	16.00	21.00	18.00	1.85	2.05	12.00
Canton, O.	2.95	15.00	.....	16.00	2.50	3.00	.....
Chicago, Ill.	2.40	16.00	21.00	17.00	2.00	2.00	.....
Cincinnati, O.	2.94	.....	24.75	16.40	2.63	2.55	.....
Cleveland, O.	2.40	14.50	.....	12.00	1.95	2.70	16.00
Columbia, S. C.	2.73	15.50	30.00	13.50	2.00	2.75	12.00
Columbus, O.	2.70	15.00	.....	14.00	.....	2.25	11.00
Denver, Colo.	2.20	18.00	35.00	22.00	1.10	1.40	.....
Des Moines, Iowa	3.08	.....	.....	20.00	1.10	.....	.....
Detroit, Mich.	2.60	.....	25.00	14.80	1.50	1.95	.....
Erie, Pa.	2.40	.....	22.50	18.00	2.00	.....	.....
Fairmont, W. Va.	2.80	18.00	.....	16.00	3.15	3.50	13.00
Grand Forks, N. D.	3.00	20.00	.....	25.00	2.60	.....	.....
Haverhill, Mass.	2.80	18.50	25.00	20.00	.....	.....	.....
Kansas City, Mo.	2.50	17.00	25.00	24.00	1.70	2.25	17.00
Lansing, Mich.	2.90	16.50	.....	22.00	2.20	.....	.....
Los Angeles, Cal.	2.30	15.20	.....	22.00	1.85	1.90	.....
Louisville, Ky.	2.52	16.00	.....	15.50	2.20	2.43	15.00
Milwaukee, Wis.	2.32	.....	25.00	15.00	1.50	1.50	.....
New Bedford, Mass.	2.60	17.50	27.00	18.50	1.75	3.00	.....
New Haven, Conn.	2.90	.....	.....	20.00	1.25	2.25	.....
New London, Conn.	2.80	18.00	25.00	26.00	1.50	3.00	.....
New Orleans, La.	2.20	18.00	.....	.....	2.35	.....	10.50
Paterson, N. J.	2.40	17.50	25.00	18.00	1.50	2.10	14.00
Philadelphia, Pa.	2.30	17.50	.....	14.50	1.75	2.60	9.75
Portland, Ore.	2.60	18.00	30.00	23.00	1.50	1.50	.....
Poughkeepsie, N. Y.	2.18	.....	.....	.....	2.25	2.00	.....
Richmond, Va.	3.10	20.00	31.00	17.50	1.95	2.45	13.00
Rochester, N. Y.	3.25	17.00	22.00	20.00	1.75	2.40	12.00
Rockford, Ill.	2.90	16.00	25.00	20.00	1.60	1.15	.....
St. Louis, Mo.	2.15	18.00	.....	18.00	1.35	1.00	13.00
St. Paul, Minn.	2.45	18.00	.....	18.00	2.23	1.75	13.00
Saginaw, Mich.	2.60	17.00	25.00	18.00	2.50	3.25	14.40
San Antonio, Tex.	2.60	19.15	.....	20.00	2.10	2.35	.....
San Francisco, Cal.	2.60	19.90	.....	22.50	1.40	1.60	16.00
Savannah, Ga.	2.25	16.00	25.00	20.00	1.75	.....	.....
Scranton, Pa.	2.80	19.00	.....	20.00	3.25	.....	.....
Seattle, Wash.	1.75	20.00	.....	22.00	1.40	.....	.....
Shreveport, La.	3.20	22.00	.....	.....	2.00	4.75	15.00
Sioux Falls, Ia.	3.00	15.00	.....	24.00	1.25	2.25	.....
Syracuse, N. Y.	3.00	17.00	22.50	18.00	2.00	2.25	12.00
Tampa, Fla.	3.00	.....	.....	24.00	2.00	4.50	.....
Terre Haute, Ind.	2.85	18.00	28.00	18.00	1.65	3.25	13.50
Toledo, O.	3.00	14.50	20.00	12.00	2.00	2.50	.....
Trenton, N. J.	2.40	17.50	26.00	18.00	1.50	2.10	14.00
Tucson, Ariz.	3.37	17.10	36.00	30.00	1.25	2.25	.....
Washington, D. C.	2.50	16.00	25.00	13.00	.....	.....	.....
Waterbury, Conn.	3.00	20.00	30.00	20.00	1.35	2.45	15.00
Yonkers, N. Y.	2.56	.....	.....	17.00	2.25	3.25	.....
Youngstown, O.	2.60	15.00	.....	15.00	3.40	2.50	14.00

Book Review

Diatomaceous Earth, by Robert Calvert. Chemical Catalog Co., Inc., 419 Fourth Ave., New York, N. Y. This 250-page volume is one of a series of monographs on scientific and technologic subjects sponsored by the American Chemical Society. It contains a description of the present-day industry of diatomaceous earth and suggestions as to desirable researches. The sixteen chapters discuss such topics as the present status of the industry, geographical distribution of deposits, mining and preparation for market, physical properties, uses in filtration, admix in Portland cement and plaster, bricks, insulations, thermal conductance, use as an absorbent, and filler. This earth is known by various trade names, such as celite, diatomite, featherstone, filler-cel, super-cel, tri-o-lite, and sil-o-cel. The chapter on mining and preparation is particularly interesting. The author explains that, inasmuch as there are ten thousand species of diatoms and that varying percentages of these have considerable effect upon the qualities that are desirable in an earth commercially, much caution should be exercised in prospecting any deposit. He speaks from first hand familiarity with the earth.

Organize Subsidiary as British Representative

The American Hoist & Derrick Co., St. Paul, Minn., the Dominion Bridge Co., Ltd., and the Dominion Engineering Works, Ltd., of Montreal, Canada, announce the formation of a subsidiary company to manufacture and sell in Canada and the British Empire the American Hoist & Derrick Company's line.

The Dominion Hoist & Shovel Co., Ltd., will have the advantage of the American Hoist & Derrick Company's 48 years of experience in designing and building hoisting and material-handling machinery and the unexcelled engineering and manufacturing experience of the Dominion Bridge Co., Ltd., and the Dominion Engineering Works, Ltd.

Bucyrus Erie Acquires Control of Monighan Co.

The Bucyrus Erie Co. has purchased a controlling interest in the Monighan Manufacturing Co. While the name of the latter company probably will be changed, the present management will remain in charge.

Alpha's Birmingham, Ala. Plant Resumes Operation

The Birmingham, Ala., plant of the Alpha Portland Cement Co. resumed operations Feb. 2, after being idle since mid-December.

Review of Foreign Practice

Permeability Tests Show Value of Fine Grinding

The search for the "best-ground" cement has recently been given new impetus, especially through the work of Kuehl, according to Dr. Ernst Rissel in *Zement* 19:1079-1080, Nov. 13, 1930. While Kuehl's researches apply principally to the purely scientific investigation of the problem and are based mainly on laboratory tests, the work of Helbig, for example, goes farther in making the experience gained available as soon as possible in practice, and in verifying the data by means of large-scale practical tests. In both cases the criterion for the cements of different finenesses is the strength properties of the mortar.

The author reports that, in tests of permeability of concrete, he has observed that the permeability of the concrete to water reacts far more sensitively to the fineness of grinding of the cement than the compressive strength. Once three cements of the same composition but of different fineness of grinding were mixed with gravel of definite grading, in proportions of 1:6 by volume, to concrete of plastic consistency. Another time the concrete was prepared from another variety of cement in two different finenesses. Of each mix three 20-cm. cubes were made, stored and tested, following the "Specifications of the German Committee for Reinforced Concrete." The preparation and testing of three specimens each for the permeability tests was done according to the procedure previously described in this magazine. The specimens for the permeability test were stored in the same manner as the cubes.

In the first variety of cement, the diminution of the residue on the 10,000-mesh sieve (that is 10,000 meshes per sq. cm.—about 250 meshes per lineal inch) from 28.6 to 11.1 per cent caused the increase of the strength to roughly twice the original figure, while the water-permeation was reduced to the 56th part. With further grinding, to 6.9 per cent residue on the 10,000-mesh sieve, the compressive strength was only slightly raised, but the permeation of water fell to zero. That is, the 20-cm. specimens at the pressure of 1.3 atmospheres used in all these tests permitted no more water to pass through, the permeation thus becoming infinitely small: not once were the test specimens wet through.

A further demonstration of the correctness of the assertion made at the beginning is afforded by concrete from the second variety of cement. With a decrease from 17.7 to 14.1 per cent residue on the 10,000-mesh sieve, the compressive strength increases from 100 to 160 kg. per sq. cm., thus 1.6 times, while the permeation of water falls from 0.0165 to 0.0060 cu. cm. per sq. cm. per hr., thus to the 2.75th part. Thus even this comparatively slight change in the fineness of grinding (this is a matter of a variation that can occasionally occur at every plant) has a much greater effect on the permeability to water than on the compressive strength.

The researches on the influence of the fineness of grinding of the cement on the compressive strength and especially on the permeability of the concrete are being continued and will be extended to the grading of the "dust-fines" in the cement, that is, to the material passing the 10,000-mesh sieve. It is to be expected that variation in the grading of the dust-fines will be more noticeable in the permeability tests than in the compressive-strength tests. Reservation must be made to refer again on occasion to details and further results. This note those interested of the observation will be only a reference to inform that is described.

In this connection it may be remarked that it will be possible at once to evaluate the effect of the different varieties of cement and the chemical composition of the cement on the properties of the concrete, and that, in this sort of comparisons, the permeability tests present a sensitive indication of variations. Special researches, which will be reported in due time, are under way. They concern principally two cements of the same fineness of grinding but of different chemical compositions: a Portland cement and a mixed cement derived from the same clinker. The investigations will be further extended to Portland cements of the same fineness of grinding but of different chemical structure.

In view of the interest of the contractor in clarifying the problem of the permeability of concrete itself, and of the fact that the permeability tests permit a better perception of fluctuations in the quality of the cement than do the compressive-strength tests, it is to be expected that the testing of permeability of cement mortar and concrete will be carried on in all relative investigations, especially in those that concern the particle grading of the cement. In this connection it is to be observed that it is possible, in every case, by changing the conditions of the tests (water-pressure, thickness of testing specimen and grading of the aggregates), to produce, from the cement under test, concrete or mortar with a permeability falling in the range of easy mensurability corresponding to the procedure involved.

Argentina's Progress in Lime and Cement Field

Limestone deposits of Argentina are limited to a few districts, the most important occurrences being in the south of the province of Buenos Aires and in the Sierra de Cordoba. A third limestone deposit in Entre Rios province south of Parana is covered by heavy overburden and plants there have only local importance. The most important lime plants are in Buenos Aires province. The Calera Avellaneda, with quarries at San Jacinto and plants at San Jacinto and Avellaneda, uses four revolving-grate kilns, employs 100 to 150 men, and has a capacity of about 120 tons daily, and the Cal Chaqui plant at Avellaneda has a capacity of 60 to 80 tons per day. Both plants have modern equipment and use coal. There are five or six smaller plants in the Cordoba district, the most important being: Ferreyra, with a capacity of 60 to 80 tons per day; Minetti, 40 to 50 tons; De Felipi (El Sauce), 40 to 50 tons; and Olmos, 20 to 30 tons. There are also other works of more or less importance in other sections; for example, in San Luis province, the Calera Argentina which has a capacity of 120,000 tons per year. The Cordoba district supplies around 2,000 to 3,000 tons of plastic lime monthly to Buenos Aires, most of it used for plastering. The country supplies its own lime needs, and the only imports are around 5,000 tons of hydraulic lime, mostly shipped in from France and Italy.

The cement industry is limited locally to the best limestone deposits. In the south of Buenos Aires province are the Fabrica de Cemento Portland San Martin, in Sierra Bayas, with a capacity of 750 tons per day, a dry-process plant built in 1918 and belonging to the International Cement Corp., and the Loma Negra plant near Olavarria, a 400-ton-per-day wet-process plant built in 1927 by Polysius, which is to be enlarged to 600 tons daily. In the Cordoba region are Vercini Garlo & Cia., Cordoba, producing only about 20 tons per day and soon to be abandoned; and Juan Minetti, Dumesnil, a plant under construction by Polysius. All cement plants use petroleum as fuel. Cement consumption in 1929 was 800,000 tons, of which 475,000 tons was imported, principally from Belgium, Germany, Sweden, Denmark, Norway and Great Britain. The construction of more plants is to be expected. The price of cement averages around 40 to 42 pesos per ton, exclusive of sacks.—*Tonindustrie-Zeitung* 54:1497-9, Dec. 1, 1930.

Recent Patents

AMERICAN

Crushing

Crushing machinery. George W. Borton, New Lisbon, N. J., assignor to Pennsylvania Crusher Co., New York, N. Y. No. 1,789,539.

Drilling

Apparatus for driving tunnels. Harry M. Fisher, Green Bay, Wis. No. 1,789,735.

Dump-car. William L. Burner, Columbus, Ohio, assignor to Western Wheeled Scraper Co., Aurora, Ill. No. 1,789,956.

Process for the transformation of gypsum. Fritz Rothe, Aachen, and Hans Brenek, Porz, Germany. No. 1,790,023.

Material-Handling

Dumping bucket. George M. Wakefield, River Forest, Ill. No. 1,790,034.

Miscellaneous

Trailer spreader for dump vehicles. Henry F. Kellner, Silver Lake, Kans. No. 1,790,050.

Plant for mixing components of concrete and the like. Paul Grunberger, Jerusalem, Palestine. No. 1,790,143.

Dump-car. Minot C. Blest, Avalon, Pa., assignor to Pressed Steel Car Co., Pittsburgh, Pa. No. 1,790,402.

FOREIGN

Blasting

Explosive. Canadian Industries, Ltd. (Thomas J. R. Alexander). Canadian 308,106.

Cement and Concrete

Process for production of fused cement and apparatus therefor. Stefan Kohut. German 516,859.

Process for obtaining hydraulic cement. Eddystone Cement Corp. French 699,723.

Process for rapid attainment of resistance to corrosive waters and for hardening concrete. G. Morbelli. French 700,394.

Crushing and Grinding

Grinding mill. George F. Pettinos. German 517,224.

Grinding apparatus consisting of a revolving trommel in which a centrifugal body rotates in opposite direction. Dr. Guenther Adam. German 516,609.

Hammers for hammer mills. Allgemeine Elektricitaet's Gesellschaft. German 516,610.

Centrifugal mill revolving around a vertical shaft, with air separation. Adolf Steinbrueckner. German 516,-611.

Pulverizers. Erie City Iron Works. French 700,306.

Remote drive for pulverizer or similar machines. Societe des Chromographes Lebaron Freres. French 700,406.

Crushing or grinding mills. H. S. Rexworthy. French 699,836.

Pulverizer. P. Gauthier. French 699,981.

Pulverizing distributor for pulverulent materials. A. M. Boisselet. French 698,967.

Grinding mills. Hardinge Co., Inc. French 699,076.

Pulverizing mills. Societe Francaise des Constructions Babcock & Wilcox. French 699,337.

Drilling

Drill. Clarence Edward Reed. German 516,866.

Drill. Emil Schweitzer. German 516,759.

Drill-hole compass. Rose Maas (Edwin L. Derby, Jr.). Canadian 308,205.

Distributing mechanism for drills. Ingersoll-Rand Co. French 699,891.

Device for pneumatic hammer drill. C. Caron. French 699,967.

Driers

Process for driving rotary driers. Kali-Chemie Akt.-Ges. German 516,-757.

Drier. William C. Carpenter. Canadian 308,241.

Gypsum

Method and apparatus for making wallboard. Gypsum, Lime & Alabastine, Canada, Ltd. Canadian, 308,141.

Manufacture of wallboard. Gypsum, Lime & Alabastine, Canada, Ltd. Canadian 308,142.

Kilns

Tunnel kiln. Ludwig Riedhammer. German 516,858.

Material-Handling

Buckets. Societe Francaise de Construction de Bennes Automatiques. French 700,149.

Elevator. Barrett-Cravens Co. French 700,163.

Elevator. A. L. J. J. G. Negre. French 700,527.

Process of attaching conveyor buckets. L. F. Gerdetz. French 699,-129.

Belt conveyors. T. G. Nyborg and M. F. Higgins. French 699,225.

Elevators. Etablissements Vernes, Guinet, Sigros & Co. French 699,229.

Scraper conveying device. Societe Ernest Heckel. French 699,355.

Automatic inclined conveyors. Compagnie des Transporteurs Simplex & A. Fouchy. French 699,448.

Safety connection for electric elevators. Schindler & Co. French 699,724.

Process and apparatus for loading bulk materials. Klingworth Carbonization Co., Ltd. French 699,803.

Device for remote coupling and uncoupling of aerial tramways. Standard Equipment Co. French 699,834.

Elevator. A. Decavel. French 699,-956.

Dustless discharging apparatus. Pass & Co. German 516,646.

Belt conveyor. Mix & Genest Akt.-Ges. German 516,649.

Car for transporting dust. Karrier Motors, Ltd., Reginald Fitzroy Clayton and John William Jemmison. German 516,957.

Roller bearings for conveying device. Vereinigte Kugellagerfabriken Akt.-Ges. German 516,958.

Chain belt conveyor. Maschinenfabrik Hasenclever Akt.-Ges. German 516,960.

Shaking conveyor connection. Elektromotorenwerk Gebr. Brand. German 516,961.

Process for separating the conveyed material from the air stream in pneumatic conveying installations. Dipl.-Ing. Wilhelm Knolle. German 517,050.

Mixing

Concrete mixer on motor truck. G. Jaeger and J. Eggert. French 699,-876.

Centrifugal mixer. K. Lehmann. French 700,083.

Sacking

Valve bag closing and sealing tool. Cornell Bag Corp. (Cornell Multi-Wall Valve Bag Co.). Canadian 308,-340.

Screening and Separating

Dust-collecting device for sintering machines. John Eckert Greenawalt. Canadian 308,255.

Separator for impact pulverizers. Paul Anger. German 517,225.

Dust-collecting system. Roberts & Schaefer Co. (Ray W. Arms). Canadian 308,178.

Screening of dry materials. I. L. Bramwell and The Birtley Iron Co. Ltd. French 700,117.

Improved device for electric removal of dust from smoke. Societe U. C. P. M. I. (Union de Consommateurs de Produits Metallurgiques et Industriels). French 700,491.

Unclassified

Method and apparatus of molding artificial stone. F. T. Walker. French 699,723.

Agitators. Joseph E. Bond. Canadian 308,014, 308,015, 308,016 and 308,017.

PIT AND QUARRY *will furnish, at its actual cost, a copy of any patent cited here. A charge of ten cents per copy is made by the U. S. Patent Office, Washington, D. C., and readers may procure a copy directly by addressing the Commissioner of Patents, with payment for copies requested. Postage stamps are not accepted by the Patent Office. We will endeavor to obtain copies of foreign patents for our readers but we cannot give assurance in every case for the reason that copies of such patents are not printed for distribution as liberally as are the American copies, nor is there a fixed charge per copy.*

Equipment Manufacturer Opens Buffalo Offices

Sprout, Waldron & Co., Inc., manufacturers of materials-handling equipment and special machinery industries, have opened an office in Buffalo.

This office has been placed in charge of F. R. Snodgrass, who goes to Buffalo direct from the home office at Muncy, Pa. The office is located at 725 Genesee Building, Buffalo.

Legal Information for Operators

Omitted Comma in Lease Changes Legal Meaning

Frequently, a mistake in the punctuation of a contract, irrespective of its nature, may result in great financial loss to operators. The omission of a comma may importantly change the legal meaning of a contract.

For example, in Rice v. Blanton, 22 S. W. (2d) 580, a company obtained a lease on real estate, and the lease contract described the property, as follows:

"All the coal minerals and mineral products, all stone and the exclusive rights of way for any pipe lines. . . ."

Later the company contended that this clause included oil and gas because coal rights usually include oil and gas. However, since no comma appeared between the words *coal* and *minerals*, the higher Court held that the lease contract did not include oil and gas rights, saying:

"Appellant (company) insists that the words 'all minerals and mineral products' include oil and gas. . . . If the instruments had used the words 'all minerals and mineral products,' and no more, doubtless there would be merit in the contention. This is a case where much depends on the punctuation. In the copy of the contract before us there is no comma between the words 'coal' and 'minerals.' Therefore, there is some basis for the view that the word 'coal' was not used as a noun, and therefore to designate a separate and distinct mineral, but was used as an adjective for the purpose of defining and qualifying the words 'minerals and mineral products'. . . . It is apparent, therefore, that the Court did not err in holding that the oil and gas did not pass by the deed. In reaching this conclusion, we do not overlook the fact that both the contract and deed used the words 'pipe lines,' thus indicating that oil and gas were conveyed."

Asking Wrong Amount May Invalidate a Lien

It is well settled that a mechanic's lien may be invalidated if the testimony is introduced showing that a material man intentionally files a lien for a greater sum than is legally due.

For illustration, in Armour v. McGinnity Co., 285 Pac. 942, it was shown that a material man filed a mechanic's lien for an amount greater than the sum which was due him according to the company's books. Therefore, the Court held the lien void, and stated the following important law:

"The evidence showed that, when Vosmer filed his lien statement against Armour, his own books showed not only that he had been paid this amount on his claim but also that he intentionally and wilfully filed it for an amount more than was due according to his own books. . . . Such conduct deprived him of any lien at all against Armour."

Delivery of Material Held Proof of Its Use

In Hortman v. Raymond, 127 So. 452, an owner of property entered into a verbal construction contract with a contractor and the latter did not furnish bond. A material man filed a mechanic's lien to secure payment for material supplied to the contractor and which was supposed to have been used in the completed building.

The owner contended that a material man is bound to prove that all material supplied to the contractor was used in the building. It is interesting to observe that the Court held that reasonable proof that the material man delivered the material to the contractor compels the owner to prove that the material was not used in the building, otherwise the material man is entitled to a lien.

Liability for Injuries Sustained Out of State

Usually, an employer is liable for injuries sustained by employees who are sent into another state or country to perform work. However, it is important to know that an employer is not liable if the employee lives in another state, performs his work exclusively there, and was hired there.

In the late case of Cameron v. Ellis Co., 169 N. E. 623, a Massachusetts contractor, who contracted to perform construction work in New York, owned and operated a gravel pit in Canada. An employee living in Canada, while working in the pit, was injured. He sued to compel the Massachusetts contractor to pay compensation under New York laws.

Although the employee was employed only for work at the pit in Canada, his work was incidental to a hazardous enterprise conducted by the employer in the state of New York. By the New York laws every employer must "secure compensation to his employees and pay or provide compensation for their disability or death from injury arising out of and in the course of the employment."

The higher Court held the contractor not liable, saying:

"When the course of employment requires the workman to perform work beyond the borders of the state, a close question may at times be presented as to whether the employment itself is located here. . . . Occasional transitory work beyond the state may reasonably be said to be work performed in the course of employment here; employment confined to work at a fixed place in another state is not employment within the state, for this state is concerned only remotely, if at all, with the conditions of such employment. . . . Here it seems to us quite evident that the claimant was not employed in New York. His employment required him to work only at a fixed place in Canada. . . . Where a workman employed in work here is called upon, in the course of his employment, to perform transitory work outside of this state, the employment as a whole remains an employment here. It is otherwise when the workman is employed to work at a fixed place or places outside the state."

Priority of Mechanic's Lien Decided by Court

Usually a mechanic's lien can not get precedence of a prior mortgage. Various courts have held that if work is started after a mortgage on the property is recorded, the mortgage is prior to the mechanic's or material man's lien.

In Miller v. Dean, 29 S. W. (2d) 736, it was disclosed that a person held a mortgage on a building and the owner, without consent of the holder of the mortgage, contracted to have the building torn down and a new one constructed. It was agreed that the contractor should use a part of the material from the old building. After the job was completed the material man filed a lien. In this case the Court held the lien enforceable not to exceed the difference between the values of the property before and after the new building was completed. This Court said:

"The fact remains that, after the old structure was torn down, then the only security the mortgagee had for his loan was the land and the salvage. When the new house was built, an improvement was erected which had not theretofore existed and which added a value to the land. This being true, we think the general rule should be applied which gives priority to the liens of mechanics and material men upon the improvement, but not upon the land. . . . It must be held that the mortgagor (owner) had no right to contract for a lien superior to the lien upon the salvage without the consent of the mortgagee. . . . We must hold that the lien of the holder of the mortgage upon the improvement is superior to the liens of mechanics and material men only to the extent of the value of the salvage that was actually used in erecting the improvement."

Insurance Problems Discussed

Your Personal Effects Protected on Journeys

ONE of my earliest recollections of the insurance business is of my father's telling about a loss he paid on the trunk of a bride and groom. The young couple had arrived at one of the big New York terminals, holding a trunk check numbered —84, only to find out that the trunk had just been given by accident to a cab driver with check —48. My father's insurance company bought the young lady a new trousseau, and that was the beginning of my life-long respect for personal-effects floater insurance.

This old form of policy becomes a matter of current interest right now because, in March, the rates will be materially increased.

Was Vacation Policy

The present-day personal-effects floater comes very near to being that ideal form of protection which would cover everything you have from any kind of loss anywhere. It is a far different contract from its early ancestors, but you cannot appreciate its value without referring to its history. A generation ago some bright underwriters realized that the ordinary fire-and-theft insurance on a man's home would not help him away from home. So they invented a coverage called the "tourist floater policy," providing indemnity against loss from fire, theft or transportation anywhere, being intended principally as a short term protection for families on vacation. This was a big addition to the early insurance field and well worth the rate charged, but later developments have broadened its scope tremendously. Among the early objections to tourist floater insurance was the rule denying it to commercial travelers. If anybody needs floater insurance, certainly it is the business man who is regularly or frequently on the road. Apparently the early underwriters feared that men would be abnormally careless about their belongings, but this feeling has changed and floater policies are now widely carried by traveling men.

Mysterious Disappearances

The greatest weakness of the original policy was that it is difficult to prove a theft loss. Many losses of personal effects are just "mysterious disappearance," often contributed to by the insured's own carelessness. You may lose something out of your hotel room, but you would have a hard time proving in court who stole it. Your grip may be "lifted" on the station platform, but wasn't that partly your fault for leaving it unattended? A good deal of friction arose over the difficulty of proving that a technical theft had been committed. So the coverage of the policy has been broadened to include loss or damage to personal effects from any cause whatsoever anywhere in the world away from the insured's permanent residence.

All-Year Protection

The third step in developing the tourist floater policy into an item of general utility was the educating of the public to carry it all the year around. As long as the policy was bought for just a three- or four-week vacation period, it belonged in the luxury class and had no place in business. But now an annual rate has been established, considerably cheaper than a proportionate extension of the short vacation rate, and most insureds now carry it continuously.

If you have had trouble following the technical points in the foregoing paragraphs, you can visualize personal-effects floater insurance by glancing over the following losses which have been paid to customers of mine under this policy form:

Suit Left in Hotel

1. The head of a large corporation went to New York on business. When he started for home he left a suit worth $150 hanging in the closet of his hotel room, but the hotel management was never able to locate it.

2. The president of a concern drove over to his factory one evening to pick up some papers. During the fifteen minutes he was inside at his desk, someone broke the lock of his automobile door and took a suitcase full of clothes.

3. A salesman lost his valise when he set it down to buy a cigar in the railroad station.

4. One of my clients, a well-known sewer and water-main contractor, had three losses within three weeks. He lost his topcoat and hat in a restaurant. Some personal jewelry disappeared from his hotel room. Finally, his daughter was up at a Wisconsin summer resort and, while she was at a dance, the resort and all her clothes burned.

5. A man, whose office is in the city but who likes the outdoors, makes his home for eight months of the year in the suburbs and spends the winter in a city hotel. His personal-effects floater gives him full fire and theft coverage while he is living in the hotel.

Golf Clubs

6. If you play golf you carry your clubs all around and may leave clothing and other effects in your club locker. All this is automatically covered under a floater policy.

7. A friend of mine had an overcoat and umbrella stolen from his office on a stormy day. They were covered by this insurance.

8. A man who traveled constantly but never lost anything finally had a claim when his son's college dormitory burned.

9. My customer's wife checked her fur coat at a large wedding reception. Most of the guests left at the same time, causing a good deal of confusion around the check room. The fur coat disappeared.

10. The most incredible loss in my experience happened just last week. My sister was carrying home a new purchase of clothing and stopped in a quiet suburban library to look up a reference. As she sat at a reading table with the package almost touching her arm, some skillful sneak thief slipped up and "lifted it." Insurance replaced the loss.

From this list of typical losses you will discover a permanent value in the contract whether you travel very much on business or not.

The two limitations which will be put into the policy in March have been made necessary by the abuse of the policy's liberality by some insureds, but they do not impair its general attractiveness. The only reason for emphasizing the changes is that, if you need this insurance, you might as well buy it at once and get the broadest contract.

New Rules

The first new rule will prevent people from using the personal-effects policy as an exclusively jewelry coverage. As everyone knows, jewelry insurance is fairly expensive and requires a biennial appraisal of every article insured. Some folks have noted that the personal floater could be used to cover jewelry without any appraisal or other red tape. People have even gone so far as to collect a repair bill on a lady's brooch which was pulled off and stepped on in dancing. Such "loss or damage" is a long way from the original fire-and-theft policy on travelers' baggage, but it is clearly covered by the modern contract. The new rule does not change this principle but, by limiting the indemnity on jewelry to twenty-five per cent of the face amount of the policy, the balanced coverage on all personal effects is restored.

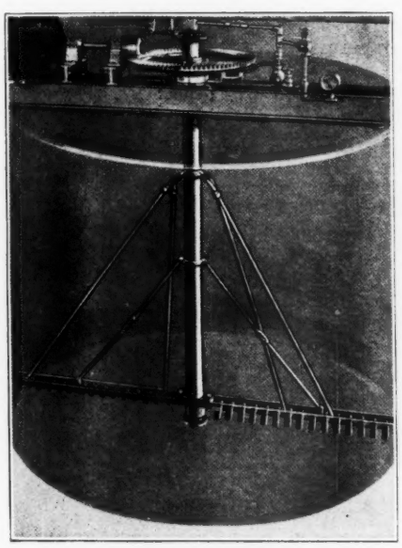
College Dormitories

The other new rule makes an extra charge of $5 a year if the policy is to include property of a son or daughter away at school. My only comment on this point is that, after years of contact with students and noting their risk of loss from "mysterious disappearance" of clothing and tennis rackets as well as from fire and theft, insurance under this broad policy form is cheap at any price.

New Machinery and Supplies

Uniform Slurry Assured by Economical Agitator

The Minogue agitator, made by The Manitowoc Engineering Works, Manitowoc, Wis., is a simple and economical device for obtaining a uniform mix in the slurry tanks, and maintaining this mix uniform. The agitator combines mechanical and air agitation. A revolving sweep in the bottom of the tanks prevents the building up of slurry and reducing the capacity of the tank by the building up of these dead areas. Air is used intermittently and is blown at predetermined intervals. In tanks up to 31 ft. in diameter, four pipes running to the bottom of the tank give efficient agitation over the whole area of the tank. By means of a control valve the air is turned on



Phantom view of the agitator.

for five revolutions and turned off for thirty revolutions. The agitator revolves at 1 r.p.m. By means of a distributing valve air is admitted to the bottom of the tank through one pipe only at a time. For instance, the air will first come out of pipe No. 1 from the inside for one complete revolution. The distributing valve will then turn this off and it will open up pipe No. 3 from the inside. Then so on to pipes No. 2 and No. 4.

Means are provided for using the agitator as a slurry mixer by using a by-pass valve around the control valve so that air is used continuously. Using air intermittently, the average consumption is 15 to 25 cu. ft. of free air per minute. This gives a maximum load on the compressor of between 105 to 175 cu. ft. of free air per minute during the time the air is turned on. When a group of agitators is installed a central-control valve can insure that the air is turned on at only one agitator at a time, assuring that the maximum load on the compressor will not be more than 175 cu. ft. of free air per minute.

Some idea of the economy of this method of agitation is given when it is appreciated that a ¾-in. pipe opened under a head of 20 ft. of slurry will use 250 cu. ft. of free air per minute at a pressure of 85 lb. This is based on actual measurements.

Due to the slow speed of the agitator the horse-power is low and, for tanks up to 31 ft. diameter, the motor required is only 5 hp.

For tanks over 31 ft. in diameter, a 7½-hp. motor for each agitator with 6 air pipes is recommended. This increases the air requirements in the ratio of 6 to 4, as the agitator still completes a cycle in 35 revolutions.

The results obtained with this agitator have been extremely gratifying and the mixture throughout the tank is maintained uniform to within one-tenth of one per cent, according to the manufacturer.

Air Control on Crawler-Mounted Diesel Drag-line

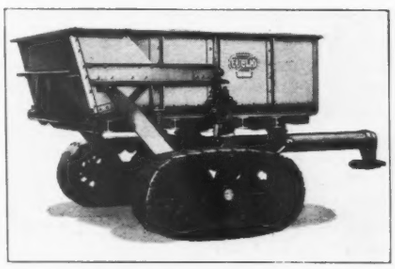
Bucyrus-Erie Co. of South Milwaukee, Wis., has just announced a new 3-cu. yd. Diesel drag-line, known as the Class 111, combining the mobility afforded by crawler mounting with an extremely large ground-bearing area which makes it possible for the machine to work and move in safety on extremely soft ground. The machine is built only as a drag-line and combines many features that make for big outputs.

The power unit is a six-cylinder, full Diesel engine of high torque, even at slow speeds, and shows unusual economy in fuel costs due to the small quantity of cheap fuel consumed.

The machine has complete air control; the short, easily-operated hand levers permit the operator to work steadily hour after hour without fatigue. Other features include steering from the operator's position; ability to swing and propel at the same time; power-driven boom hoist; non-collapsible Bucyrus-Erie bucket; box-type lattice boom; large area cone-swing clutches, silent engine transmission fully inclosed and running in oil, and simple dependable time-tried construction throughout. A bulletin on this machine may be had by writing the manufacturer, mentioning PIT AND QUARRY.

Offers Two Dump Wagons for Handling Stone, Sand

The new 8 cu.-yd. Euclid track-wheel gravity rear-end dump wagon meets the long existing need for a heavy-duty wagon. It is particularly constructed

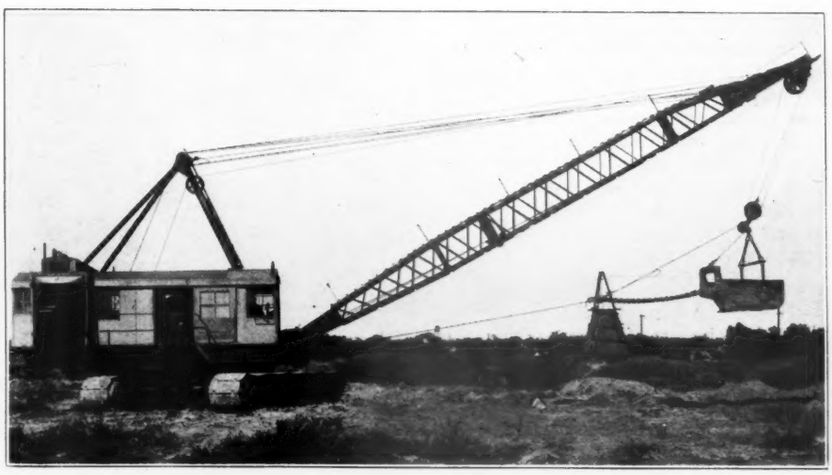


Gravity rear-dump wagon.

for working under a shovel and for hauling rock, dirt, clay, sand or shale.

The body is constructed of steel of special analysis to resist the abrasive action of sand, gravel and stone. A carbon steel reinforcing plate is located upon the bottom of the body for protection against heavy rocks. Alloy steel castings at the corners of the rear body opening eliminate the possibility of rocks or other material warping the sides out of shape.

This husky wagon is exceptionally



New 3-cu. yd. Diesel drag-line on crawlers.

Hydraulic bottom-dump wagon.

easy to handle and is under complete control of the tractor driver from his seat on the tractor. The wagon is dumped by means of a trip cord from the driver's seat to a lever on the wagon. The wagon unloads itself by gravity, and when empty falls back automatically into the loading position. There is no human or mechanical assistance necessary for either operation and no man is required at the dump.

It features a rear gate allowing full 8-cu. yd.-capacity loads and is so arranged to raise upward at a steep angle, freeing the material at the start of the dumping and permitting ample space for discharging all loads. When hauling extremely large rocks this gate can easily be removed, leaving the rear end open for easy discharge. In cases where a driver does not get close enough to fill, he can use the wagon as a bulldozer to push the material over the fill.

A new hydraulic bottom-dump wagon has also been placed on the market recently. The tractor driver has complete control of dumping and door-closing operations from his driving position. No manual effort is required at the dump, as all door motions are operated hydraulically by means of a lever conveniently located at the driver's seat.

Hydraulic pressure is supplied by the Euclid simplified hydraulic pump attached to the rear of the tractor. This compact pump with few working parts, including the Euclid improved valve, assures proper pressures and eliminates excessive leakage so often found in this type of equipment.

The door-lifting jack is located inside the tubular section of the wagon drawbar. This design affords complete protection for the jack and keeps out the dirt and dust. The end of this tubular section carries a removable cover plate. When this plate is off, the jack can be easily pulled out from the end of the drawbar for inspection or repair.

Hydraulic Control on New Roll-Over Scraper

A recent addition to the LaPlant-Choate line of equipment for use with Caterpillar tractors, is a hydraulic roll-over scraper. This scraper is in general design similar to the conventional type of roll-over scraper. The following advantages, however, are claimed for it by the manufacturer.

The hydraulic control gives the operator the ability instantly to control and vary the cutting depth, by merely shifting a lever from the seat. This instantly variable adjustment and the use of a narrower but deeper bowl makes loading easier and permits hauling of larger capacities with the same power unit. It also eliminates delays from the tractor stalling due to variation in soils while loading. It also makes it possible to rotate the bowl backwards after loading on its carrying runners to carry the load rather than to drag it. It also permits spreading in instantly variable depths. The load may be dumped in one pile, or spread in any desired layers. This scraper may also be backed up if desired.

The company already has approximately 3,000 pieces of hydraulic equipment in use today, and this application of hydraulic power to a roll-over scraper is an answer to many requests from scraper users for a scraper with positive and instantly variable control of the cutting depth.

A complete circular describing this unit will be sent upon request by writing direct to the LaPlant-Choate Mfg. Co. Inc., at Cedar Rapids, Ia., mentioning PIT AND QUARRY.

Builds Big Mixers for Mixed-Concrete Plants

Two big mixers—the 56-S and 84-S—are described in a new bulletin, No. 122, recently published by the Ransome Concrete Machinery Co. of Dunellen, N. J.

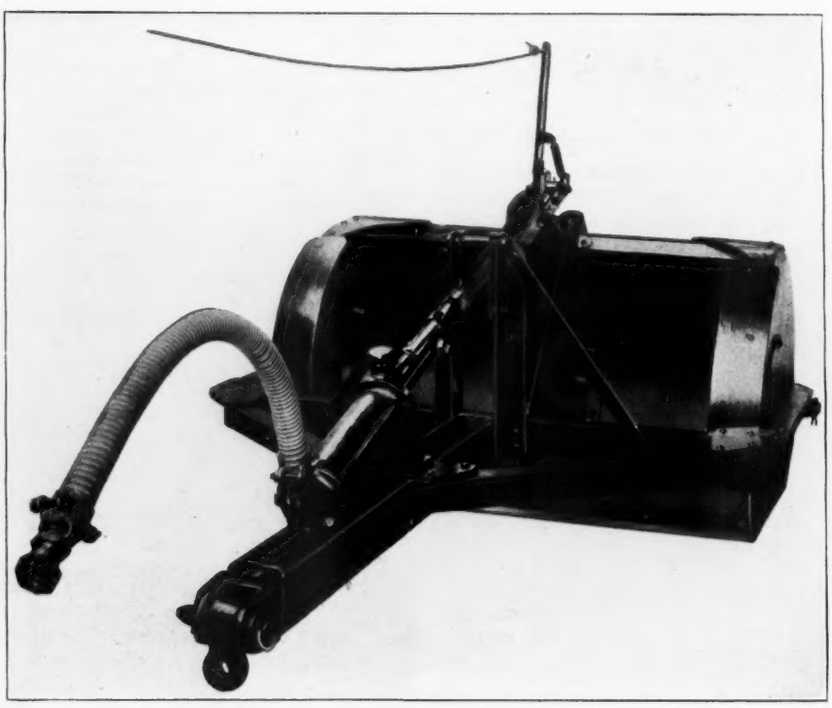
In 1902 this company built a number of unusually large mixers for the United States Navy. From that date Ransome has utilized its specialized knowledge of "big" mixers and put it into the 56-S and 84-S of the present day—backed with all the general experience dating back to 1850.

Ransome 56-S and 84-S mixers are used in three distinct fields—on large construction jobs, in industrial plants and the mining field, and for central mixing plants.

Among the many features of these mixers are an unusually strong main frame, drum rollers made of car-wheel iron, Timken bearings, fully protected by dust caps, drum-roller tracks of locomotive tire steel.

The overhead frame has been lowered considerably, which means that the total height of the plant as a whole can be kept lower. The nonslopping rings on the feed and discharge ends of the drum have been improved considerably, so as to make them more efficient and easier to get at for replacements. The mixing blades are now lined throughout, instead of only the pick-up buckets.

The mixing action is exceptionally



Hydraulic roll-over scraper. Note hose connection.

fast and the quality of the mix is accurate—a vitally important point when the value of a single batch runs into thousands of dollars.

The spiral cut-off water tank is standard equipment. One turn of the control wheel changes from the maximum to the minimum amount of water that can be discharged from the tank. This change can be made instantly. It is impossible to by-pass any water through the valves on these mixers.

Nine 56-S mixers were used in the construction of the Welland Canal. One concern and its subsidiaries in the industrial field have thirteen of these mixers. A central-mixing plant company operates five.

Introduces New Carrier for Concrete Materials

The Cementank is a new Blaw-Knox product—a steel cement container for batch trucks on highway paving or other work where the cement is proportioned into compartment trucks at a central plant, and then hauled to the paver or mixer.

It is of all-steel welded construction, moisture-proof, equipped with a top cover and a discharge door which opens automatically when the compartment is dumped. The Cementank requires absolutely no attention on the part of the operator, the cement empties by gravity and flows with the aggregates into the skip of the mixer. Arching of cement is prevented by the shape of the tank and its method of discharge.

The discharge door is flashed with felt to prevent leakage of cement. Locking of the end gate or truck partition automatically locks the discharge door of the carrier.

The Cementank has a capacity of 10.35 cu. ft., which is ample to take care of a seven-bag batch. It is 2 ft., 5¼ in. high and 4 ft., 11¼ in. wide.

Skid-Handling Truck of Four-Wheel-Drive Type

A new four-wheel-drive, skid-handling truck has recently been added to the line of materials-handling equipment manufactured by the Terminal

Four-wheel-drive handling truck.

Engineering Co., New York. The machine is small enough to work in box cars, yet carries its loads of 3,000 lb. in an overhung position.

The skids used with this new elevating truck are the lowest possible and hence the most economical. The skid height need only be 2 inches below the platform. Both the travel and elevating speeds of the new truck enable it to perform work unusually fast. Having a four-wheel, four-motor drive, the truck travels 10 m.p.h. empty and 7-9 m.p.h. with a 1½-ton load. The elevating speed varies from 25 ft. to 40 ft. per minute with the standard motor, but increases up to a maximum of 60 ft. per minute if a special high-speed hoist motor is used.

The loads are all carried in an overhung position with no wheels directly under the load. The overhung design enables tiering skids without the aid of a helper, thus speeding up the work and lowering the operating costs.

The truck is operated from a storage battery which is in a steel compartment, placed over the wheels at the driver's end, to act as a counterbalance. As with all equipment made by the Terminal Engineering Company, this elevating truck is designed for quickly and easily interchanging batteries for continuous operation, 24 hours per day if desired.

A maximum counterbalance is obtained by locating the battery and hoist as far away from the load as possible at the opposite end of the frame. Heavy loads carried on any overhung type truck tend to transfer the weight to the wheels near the load and thus leave the wheels farther from the load (which are usually the driving wheels) with very little load on them. The result is a loss of traction which is not encountered when all four wheels are driven. With the four-wheel drive, the greater the load, the greater the traction.

Small Worm-Gear Speed Reducers Find Wide Use

A new line of small worm-gear speed reducers has been announced by the Horsburgh & Scott Co., Cleveland, O. These are intended to supply the need for reliable instruments in small sizes. Each consists of a worm and a gear accurately mounted on bearings and totally enclosed in oil-tight and dust-proof housings. They are self-lubricating, rugged and occupy very little space. They eliminate belts, chains and exposed gearing. Their large reduction ratios permit the use of high-speed motors. One series is built for a maximum torque in the gear-shaft

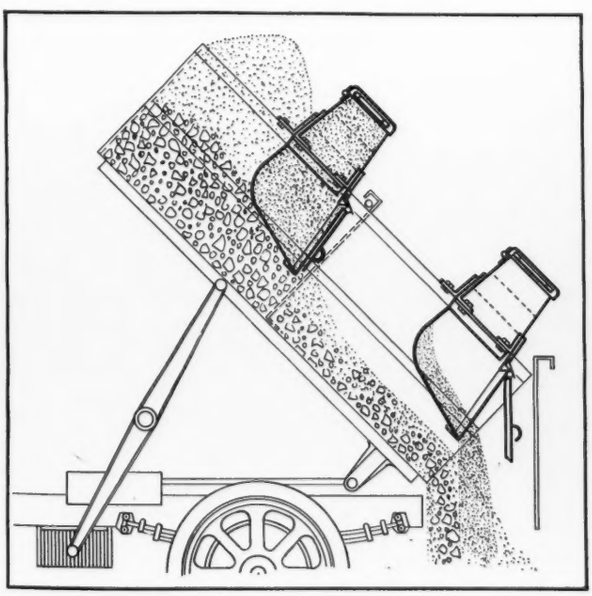
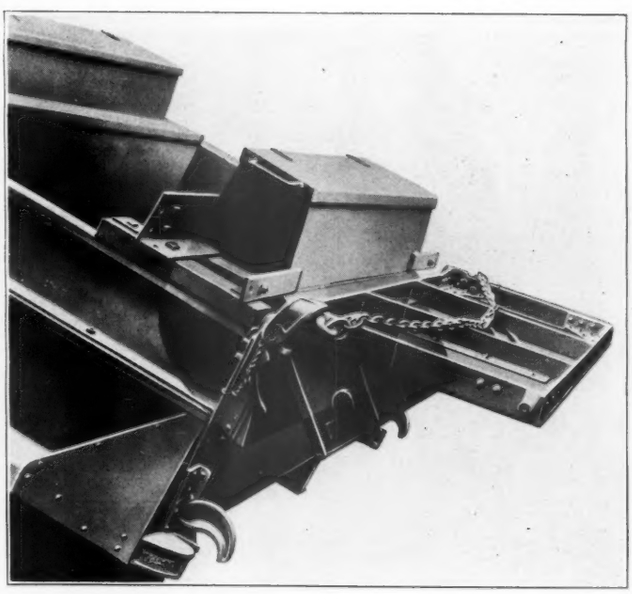


Diagram of body in dumping position.



Close-up view of rear end of carrier.

Open view of worm-gear speed reducer.

of 1,100 in.-lb., while another series is for 2,140 in-lb. Both series are furnished in all ratios between 4⅛ and 60, at worm-shaft speeds varying from 300 to 3,000 r.p.m.

Each worm is an integral forging with its shaft and the threads are of glass hardness. The solid bronze gear is extra wide. Perfect alignment is provided by radial thrust bearings on the worm-shaft and Timken bearings on the gear-shaft.

Automatic Device Cleans Out Excavator Buckets

The George Haiss Mfg. Co. Inc., New York, is presenting the new Haiss bucket clean-out device for sticky clay, which is used on the Haiss excavator.

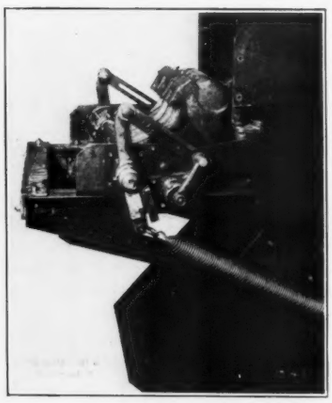
The device consists of teeth or prongs on a swinging shaft mounted on an extension of the elevator frame. As the buckets turn around the head shaft, these prongs enter each bucket at the inside of the teeth and the motion of the bucket pushes the prongs through the clay, which is thrown off, and when the bucket leaves the prongs they are brought back into position for the next bucket by heavy springs.

The impact of the return of the teeth is taken up by Houdaille shock-absorbers and a bumper finally stops the motion. The various leverages, the spring strength and tension, and the size, stroke and setting of the shock-absorbers are so balanced that the teeth return to rest in time for each succeeding bucket without re-spacing and there is no rebound and no shock on the bumper.

Excavator equipped with bucket clean-out.

The entire structure is heavy enough to stand the work, and the swinging-shaft is so linked to the head shaft that the clean-out can not get out of proper mesh with the buckets, and it is impossible to adjust one without the other.

The design of the teeth both as to form and strength was arrived at after many experiments and much consideration. They are so shaped that they will enter, and not be pushed out of the way by, the clay on the bucket teeth. Danger of wedging against stones in the buckets is minimized by the shape of the teeth, and maximum clearance provided for the clay to discharge so that it will not build up.



Details of the bucket clean-out.

Material dug by the excavator and cleaned out by the bucket cleaner is broken up into small pieces which are comparatively easily compacted into a good embankment. This is not the case with any other excavating tool. This point is of much interest to operators who usually have to work on a balanced cut-and-fill basis.

Gravity-Dump Wagon Is Speedy Material Mover

An automatic gravity tractor dump wagon, called the Camel, has been introduced by the Shunk Manufacturing Co., Bucyrus, O. Pit and quarry operators are finding a wide use for haulage units of this kind and the Camel seems to fill the bill.

The machine, illustrated here, combines the salient features of the truck, tractor, trailer and bulldozer. Its large capacity, combined with an inherent ability to operate successfully regardless of weather or haulage conditions, enables it to move much greater yardage than is possible with teams, trucks, or trailers.

Automatic gravity dump wagon.

The nose of the Camel may be converted into a bulldozer; the draw-bar attached to the heavy auxiliary axle in the rear may be used for general draw-bar work.

The bulldozer, an outstanding feature, is built substantially for severe punishment and designed to bulldoze, grade, level and backfill. It is recommended for use with tracks.

An important feature of the Camel's design is its heavy auxiliary axle of high-carbon steel, fitted with Timken bearings, which carries the full load of the tractor, frame and payload, thus relieving the driving axle of all strains from load carrying and allowing the full power of the tractor to be realized in moving the vehicle.

New Drag-line Chain Is Built Up of Cast Links

Naco drag-line chain is cast from steel by a process exclusive to the National Malleable Steel Castings Co., Cleveland, O. Each link is cast in one solid piece in a sand mold made from standard patterns. Every link is, therefore, uniform in size, shape, weight and wire gauge diameter. There are no joining welds or other weak spots in the link to break or shorten its life.

This chain, size for size, is one of the strongest chains made for drag-line service. Circular No. 89-A will bring full particulars of this new development.

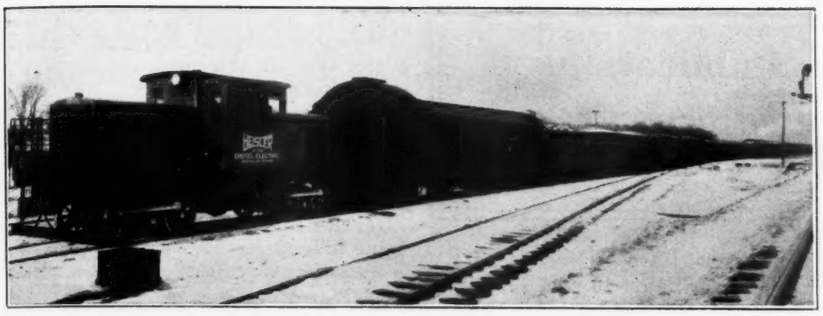
Tests Diesel-Electric Industrial Locomotive

A new 60-ton, 360-hp., oil-electric locomotive, for more efficient switching and hauling in quarries, around gravel pits, cement plants and industrial operations, has been developed by the Heisler Locomotive Works, Erie, Pa.

To determine the actual performance characteristics of this locomotive, one of the few dynamometer cars in the country, that of the New York Central Railroad Co., was engaged for a series of tests. This special testing car is manned by a crew of specially trained engineers.

The dynamometer car accurately recorded the power, speed, rate of acceleration and useful horsepower developed by the Heisler oil-electric locomotive.

The test car was coupled between the locomotive and a string of hopper



Locomotive and loaded cars under dynamometer test.

cars filled with coal, with a steam locomotive at the rear to increase the load by setting the air brakes on the freight cars.

When the new Heisler pulled its load, and when the load was increased by application of the air brakes, sensitive recording instruments in the dynamometer car registered the exact hauling effort. These readings give an accurate record of the drawbar pull developed which, at the maximum, was the pull required to haul a train of 80 loaded cars.

After tests had been made on straight level track, further tests were made on a 3-per cent grade with a 14-deg. curve, with equally satisfactory results. The new oil-electric locomotive out-performed an 80-ton superheated-steam engine under these conditions.

It is probable that the new locomotive will next be tested thoroughly in actual industrial service, in the plant of a leading steel company.

In addition to the great increase in hauling power, the Heisler oil-electric locomotive offers other worthwhile economies. It burns only $2.50 to $3.50 worth of fuel oil in a day, to do the same work for which a steam switching locomotive burns $20 to $30 worth of coal per day. Further, due to the fact that the oil-electric locomotive is smokeless, it is especially desirable for use in the near cities. Another saving is in labor, as only an engineer is needed to operate it, no fireman being required.

The construction employed in the new locomotive permits the electrical equipment to develop greatly increased tractive effort at its hourly and continuous ratings. The design also gives very high starting adhesion as all wheels turn together and no pair of drivers may slip and cause loss of starting tractive effort.

Two 180-hp. Buda Diesel engines deliver their power to two Westinghouse D.C. generators which, in turn, supply the current to two traction motors mounted underneath a Commonwealth integral cast-steel frame. The traction motors are spur-geared to a center drive shaft which transmits the power through a pair of bevel gears to one axle of each truck. By means of side rods the power is delivered to the other driving wheels. The driving gears are surrounded by Timken roller bearings.

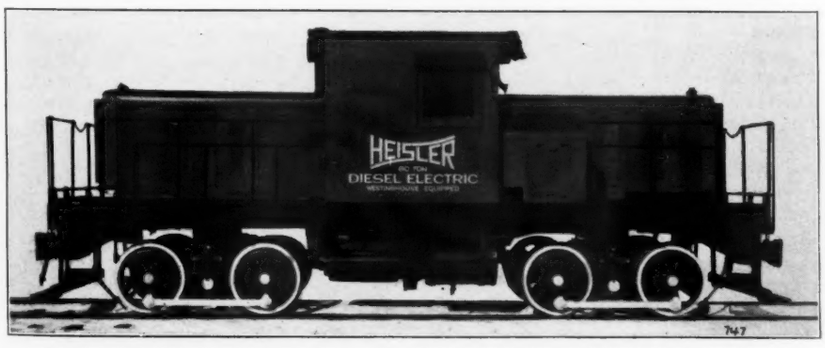
Universal joints in the drive shaft permit the trucks to swivel freely and make it possible for the locomotive to work on extremely sharp curves. The trucks are of the same basic design as those used on hundreds of Heisler steam locomotives, retaining all their flexibility with improved construction, according to the manufacturers.

It is interesting to note that this is the first internal-combustion electric locomotive so constructed, the usual practice being to use four motors mounted in the trucks, gearing them to the driving axles.

The electrical equipment of the locomotive comprises standard Westinghouse railway apparatus with differential field control. This equipment, while very efficient, is extremely simple, lending itself particularly to industrial operations.

An interesting feature of the locomotive is that, for light work, it may be operated by one engine and generator, giving the equipment a better loading and thus obtaining lower fuel consumption.

To insure ample air for switching service the locomotive is equipped with two Gardiner-Denver duplex compressors, one compressor driven from each engine. The combined output is 118 cu. ft. of air per min., the equivalent of an 8½-in. cross-compound pump as used on a steam locomotive.



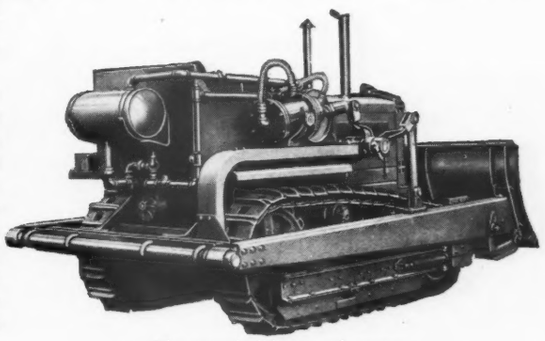
The 60-ton Diesel-electric locomotive.

Designs New Hydraulic Bulldozer for Tractors

One of the latest additions to the lines of the Foote Bros. Gear & Machine Co., Chicago, Ill., is the Bates hydraulic bulldozer built especially for use in combination with Bates crawler-type tractors.

In addition to having unusual simplified design and exceptional sturdiness, all of the operating mechanism is located below the level of the seat, giving clear vision of the operator.

The oil pump is easily started or stopped by throwing the small clutch lever located below the driver's seat. When in operation, the control of the oil pressure in the hydraulic ram raises or lowers the blade of the bulldozer in two to four seconds time, depending on the blade clearance.



The new bulldozer and tractor.

A three-way valve controls the oil supply. One position of the valve handle forces the oil in at one end of the cylinder and lowers the blade. In another position it forces the oil in at the opposite end of the cylinder and raises the blade. The neutral position by-passes the oil back to the tank and holds the blade of the machine at any height desired.

The bulldozer is built with a heavy frame with exceptional ground clearance, and so attached that it does not interfere with the normal operation of the tractor. This frame is bolted on to the crawler frame at back of the tractor and the lifting mechanism is attached to the tractor frame just behind the engine.

The major portion of the weight of the bulldozer is carried in the blade with the pivot point at the rear of the frame. The action of the lifting mechanism located half way between the pivot point and the blade on the bulldozer frame throws all the weight to the front and holds the tractor and the bulldozer blade into the ground.

Manufacturers' Publications

Each publication listed below contains information of interest to nonmetallic mineral producers. Readers may obtain, without charge—except where a price may be stated—and without obligation, copies of any of these publications by writing directly to the manufacturers who publish them. Please mention PIT AND QUARRY *when writing.*

Air Compressors

Pennsylvania Compressors. 4 p., 4 ill. (Bulletin 102. Pennsylvania Pump & Compressor Co., Easton, Pa.) A general leaflet on air compressors featuring this company's method of "dual compressor control."

Concrete Carriers

The Story of Jaeger Super-Concrete. 20 p. Illustrated. (Catalogue TM-31. The Jaeger Machine Co., Columbus, O.) A deluxe book describing and illustrating agitating carrier bodies for transporting ready-mixed concrete; accessory equipment, blue-prints of plant layouts and views of the equipment in scores of plants are also included.

Crushers

Sledge-Wedge Crushers. 8 p., 12 ill. (Catalogue C-95. McLanahan & Stone Corp., Hollidaysburg, Pa.) Describes and illustrates a single-roll crusher embodying the important features of the ordinary roll, plus those of the gyratory, jaw, swing-hammer, cone and pot crusher.

Drills

Worthington-Gilman Rock Drills. 4 p., 19 ill. (Worthington Pump & Machinery Corp., Harrison, N. J.) A booklet of condensed information on a complete line of rock drills, each of the balanced, independent-motor, rotation type.

A Handbook of Rock Drill Steel. 48 p. Illustrated. (Circular No. 72-K. Sullivan Machinery Co., Chicago, Ill.) A reference book on drilling, describing the selection, heating, forging and tempering of drill steel. Includes instruction for the care and use of drill sharpeners and drill-steel furnaces.

Dump Wagons

The Euclid "Track Wheel" Dump Wagon. 4 p., 2 ill. (The Euclid Crane & Hoist Co., Euclid, O.) Describes and illustrates a bottom-dump crawler wagon in 7-cu. yd. and 8-cu. yd. capacity. Specification table included.

Dust Collectors

Thermix Dust Collectors. 4 p., 6 ill. (Prat-Daniel Corp., New York, N. Y.) Describes and illustrates fan-type and cyclone dust collectors. A list of some of the important cement plants and other concerns using the equipment is included.

Loaders, Portable

The Link-Belt Grizzly Loader. 6 p. Illustrated. (Link-Belt Co., Chicago, Ill.) Describes and illustrates a portable loader mounted on crawlers. Several new features in the loader are described, the steel-spiral feeder being of outstanding interest.

Lubricants

D-A Lubricant. 16 p., 7 ill. (The D-A Lubricant Co., Inc., Indianapolis, Ind.) Points out the advantages of a Pennsylvania oil, thickened to four densities and gauged to meet the lubricating conditions met with in trucks, tractors, shovels, cranes and other pit and quarry equipment.

Plant Equipment

Catalogue. 56 p. Illustrated. (Iowa Manufacturing Co., Cedar Rapids, Ia.) A complete catalogue describing and illustrating crushers, material-handling equipment, and a "one-piece outfit"—a portable plant which crushes, screens and loads in one operation.

Scales, Hydraulic

The Master Percentage Gauge. 6 p. Illustrated. (Hydraulic Scale Co., Shawano, Wis.) A folder describing and illustrating a recent development for dredge operators which accurately measures the amount of solid material passing through the dredge suction line.

Screening

Perforated Plates for Vibrating Screens. 12 p., 16 ill. (Hendrick Manufacturing Co., Carbondale, Pa.) Describes and illustrates a line of perforated metal plates for use on vibrating screens comparing these with woven-wire types. Complete specification tables are included.

Simplicity Gyrating Screens. 24 p. Illustrated. (Catalogue 32-G. Simplicity Engineering Co., Durand, Mich.) Describes and illustrates a gyrating screen built in a wide range of sizes and from single to triple deck. Drawings and tables indicate installation dimensions and specifications.

Speed Reducers

Jones Worm Gear Speed Reducers. 8 p., 9 ill. (Bulletin 49. W. A. Jones Foundry & Machine Co., Chicago, Ill.) A special bulletin covering a new line of worm-gear reducers for small electric-motor drives, which supplement the Jones heavy-duty line of speed reducers.

Small Heavy Duty Worm Gear Speed Reducers. 30 p. Illustrated. (Catalogue 135. D. O. James Mfg. Co., Chicago, Ill.) Describes and illustrates a complete line of small worm-gear reducers of the heavy-duty type. Specification, performance tables and installation views are shown.

Tractors

Extra Power Cletrac 80-60. 24 p. Illustrated. (Cleveland Tractor Co., Cleveland, O.) Describes and illustrates an "extra horsepower" crawler tractor developing over 90 hp. according to the University of Nebraska tests, the complete report of which is included for this model.

Welded Steel

Lukenweld Construction. 20 p. Illustrated. (Lukenweld, Inc., Division of Lukens Steel Co., Coatesville, Pa.) Describes and illustrates the advantages and wide variety of uses of a fabricated product obtained by welding rolled steel into desired shapes and sizes for machinery and machinery parts.

Wire Rope

Hazard "Korodless." 6 p. Illustrated. (Hazard Wire Rope Co., Wilkes-Barre, Pa.) A mailing piece devoted to a description of a new industrial wire rope made of chrome-nickel stainless steel.

New Corporations

NORTH CINCINNATI SAND & GRAVEL CO., INC., Cincinnati, Ohio. $30,000. Leonard H. Freiberg, St. Paul Bldg., Cincinnati.

CLEARWATER GRAVEL CO., Bagley, Minn. $50,000. C. H. Taylor and A. C. Taylor, Duluth, Minn.; George Campbell, Eveleth.

ACME GRAVEL CO., San Antonio, Tex. $5,000. R. W. Ingram, H. B. Ingram and J. E. Ingram.

MCMASTER & HUNTER FLUORSPAR CO., Mexico, Ky. $5,000. R. C. McMaster, Ford Hunter and Herman Winstead.

BEAVER DAM MARL CORP., Gloucester, Va. Eugene M. Nourse, Russellville, Ky.

Appoints Montreal Firm Distributor for Canada

The Good Roads Machinery Co., Inc., Kennett Square, Pa., has concluded arrangements with Mussens, Ltd., of Montreal, to act as distributors for the products of the company throughout the Dominion. Mussens, Ltd., with headquarters at Montreal, cover Canada from coast to coast. In addition to the offices at Montreal they have large distributing warehouses at Toronto, Winnipeg, and Vancouver.

Pre-Historic Skeletons Sought in Stone Quarry

Hoping to unearth the teeth or tusks of an extinct glacial-period animal, Dr. Rufus M. Bagg, Wisconsin geologist, has announced his plans to continue a search of the Sherwood stone quarry on the west shore of Lake Winnebago near Appleton, Wis. Huge bone fragments found recently at the quarry belong to a mammoth or mastodon of the glacial era, Dr. Bagg believes.

Plans are under way for the erection, by the Consumers Rock & Gravel Co. of Los Angeles, of an asphaltic-concrete mixing plant to be located in the San Fernando Valley.

Unsafe Floors, Proper Use of Signs Are March Safety Topics

By W. DEAN KEEFER
Director, Industrial Safety, National Safety Council

A PLANT safety program usually will not be complete without the liberal use of safety signs. So we are suggesting the topic "Safety Signs" for your March plant safety meeting. As a supplementary topic we suggest a discussion of the hazards from "Unsafe Floors."

Safety signs should not be confused with safety posters; safety posters was a suggested topic of discussion for a meeting previously outlined in this series of articles. Safety posters, of course, are closely related to safety signs, and both kinds of safety warnings have their own special advantages.

It is suggested that your chairman should arrange beforehand with one or more members of your plant-safety committee so that they may be prepared to discuss certain angles of the importance of plant-safety signs.

To insure that the topic shall be properly handled it might be well to suggest that there be prepared papers which could be read before the meeting, as preliminary to a general discussion. The general discussion then should include special conditions in the plant and suggestions for changes or improvements.

These papers might discuss such phases of the general subject as:

What a safety warning sign means to me,

Why warning signs are helpful, and

Proper placing and maintenance of signs.

The persons who prepare these papers may obtain special data, if they desire, through a study of Safe Practices Pamphlet No. 81 of the National Safety Council on "Warning Signs—Their Use and Maintenance" which may be secured without cost.

There are a number of basic principles which should be kept in mind in the discussion of safety signs. Most safety engineers agree that there is a possibility of overdoing the use of warning signs. These men point to the old adage "familiarity breeds contempt," and advise that the number of signs in any plant be limited only to those which are considered absolutely necessary to point out specific hazards which cannot otherwise be safeguarded. In other words, a warning sign should never be used as a substitute for a safeguard if the latter can be devised or the hazard eliminated. Nevertheless, it may sometimes be advisable to use a warning sign temporarily until the necessary safeguards can be provided.

Warning signs may well be used at places where there are hazards from falling material, yard railroad crossings, aisle or road intersections where motor trucks are used, where men are working overhead or below, openings on the level, where there is not sufficient clearance for a trainman riding either on the top or on the side of a car, entrances to plants, employment offices, exits, in power houses, or in places where there are peculiar or unusual hazards.

When the general location for a sign has been determined, it should be placed so it will be directly before a man who is liable to expose himself to the dangerous position in question. It is generally agreed that the proper elevation for warning signs is slightly

Experience is a great teacher - but let the other fellows' mistakes do the teaching
BULLETIN BOARD
EYES
There's a lesson in each Safety Poster
LET'S GET IT

above the level of the eyes of the average worker and sufficiently ahead of the hazard so that the worker will have ample time to heed the warning.

A warning sign should not be placed or fastened in such a manner as to create a hazard in itself. There often is value in changing the location of signs, to attract special attention. When the danger to which the sign calls attention no longer exists, the warning sign should be removed. All employees should be required to give strict attention to warning signs.

After the general discussion of this topic, the chairman may appoint a subcommittee composed of members from different departments and ask that a report be made at the next meeting, covering the actual condition of signs in the plant. This sub-committee should check up on all signs and answer such questions as:

Are all the signs that are in our plant at present needed?

Is there a real hazard where each warning is placed?

Are additional signs needed?

Have any present signs become unreadable?

Should the wording of any signs be changed?

Are all signs properly placed?

Are the signs in our plant being heeded?

After a general discussion on the hazards of "Unsafe Floors," the chairman should ask for reports on conditions in the plant which may be considered as present hazards. Or a special committee may be appointed to make a report at the next meeting.

The discussion of this subject should bring out such facts as:

Are any floors in the plant broken?

Are passageways obstructed through the condition of the flooring?

Are there any slippery floor conditions which might cause falls?

Are there any projections of floors, holes or nails which might be considered hazardous?

Is there sufficient lighting for the best use of floors?

Are any of the floors overloaded?

To stimulate added interest in the topic of floors, the chairman may prepare, in advance, plant statistics to indicate the number and severity of accidents which have resulted from floor hazards.

Testing-Sieve Research Is Reported at Vienna

(*Continued from page 66*)

cent, by two false meshes with an error of 51 per cent. The sieve used in these experiments had a width of mesh of 1.35 mm. Another sieve with a width of mesh of 2.04 mm. gave an oversize of about 3.5 per cent, during a ten-minutes' sifting period. Therefore, the sieve with a width of mesh of 1.35 mm. and two false meshes with an error of 51 per cent, gave about the same result, during a ten-minutes' sifting test, as a sieve with a width of mesh of 2.04 mm. without false meshes."

Furthermore, it was agreed that the ratio between wire diameter and width of mesh was an important factor and should be given due consideration. For example, in the German standard this ratio is 2:3.

As the practical low limit of the width of mesh, the size of 40 mu was proposed (1 mu equals 0.001 mm. or about 0.00004 in.), and, as the maximum limit, the value 25 mm. The Polish secretariat was asked to work out a proposal based on a geometric series of mesh widths.

The conference was of the opinion that the time was not yet ripe for discussing the question of tolerances on the width of mesh and on wire diameter.

A proposal of a series of standard testing sieves believed to be internationally acceptable will be submitted, when it has been worked out by the Polish secretariat, and American interests will be asked to submit criticism and comments on the proposal and make such counter-proposals as they see fit, reflecting the position on the subject in the United States.

Only one moving part—no gears, oil pumps or babbitted bearings—rugged construction—but little head room required—these and a host of other features make the Ohio Crusher ideal for use in your plant.

THE OHIO CRUSHER

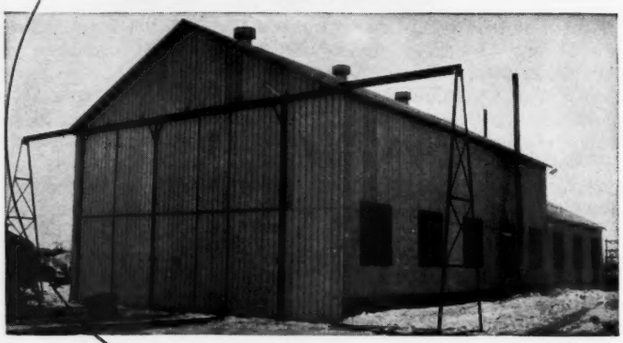
The Ohio Crusher consists of a heavy cast-steel frame to which two curved manganese steel crushing plates are rigidly attached. The curved plates are adjustable in order that crushed material of the desired size may be obtainable. Between these curved plates, an alloy-steel eccentric shaft revolves in a steel cylinder, which floats on roller bearings and, at each revolution of the shaft, oscillates between the curved plates, an action which crushes material fed to the machine. The cylinder does not revolve, and is equipped with replaceable manganese wearing plates.

James H. Beans Fdry. Co.

Martins Ferry, Ohio

MADE ENTIRELY OF STEEL

BUTLER



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STEEL BUILDINGS

For Mining Operations

Economical to Acquire—Economical to Transport—Economical to Install—Economical to Maintain—more so than any other fire safe type of construction are Butler Ready-made Steel Buildings.

Their standardized unit design makes possible transporting to location by pack train if necessary. Complete materials, ready-made, lets erection go forward without interruption, and by whatever labor crews are available. Permanence is inwrought in both materials and construction yet the structural design permits enlarging, taking down and re-erecting. Made entirely of steel Butler Steel Buildings are fire safe, off-setting lack of full fire protection at remote locations.

Butler Ready-made Steel Buildings are used extensively for living quarters—cottages, hotels, mess halls and bunk houses. Opposite is pictured a two family Bungalow insulated within and affording real comfort.

A new booklet picturing installations of many types of Butler ready-made Steel Buildings awaits your request.

BUTLER MANUFACTURING COMPANY

1248 Eastern Avenue, Kansas City, Mo. — **948 Sixth Avenue, S. E., Minneapolis, Minn.**

A Sturdy Dragline

without excess weight

BY better design, the weight of the new ERIE Dragline has been kept down without sacrificing the necessary Sturdiness and Digging Ability.

Less weight to handle means easier operation— better speed and more output— lower operating costs. The crane's capacity is increased, with lower cost per yard handled.

Perfectly balanced

The center of gravity is correctly located at all stages of operation, and the hoist trunnion brackets are accurately placed— a combination that gives *perfect balance.* This means easier and faster operation— free quick dumping when the dump line is released.

The sides do not pull in

Extra strength is built into the sturdy structural steel bridge which is tied securely into the lip and side plates. No failures at this common point of weakness.

Other advantages of the new ERIE Dragline are the rigid cast steel hitch plates, and "Westeeco" teeth, the points of which can be removed and either reversed or redressed. *Write for Bulletin "Q-7."*

ERIE STEEL CONSTRUCTION COMPANY

617 Geist Road

Erie, Pa.

The AggreMeter Plant to exactly suit your work—

The complete ERIE line of AggreMeter Plants includes the type and size plant you want— from small portable plants to complete central mixing plants of any capacity— 2-compartment or 3-compartment bins. Write for photos and specifications of the type and size you are interested in.

ERIE AGGREMETER PLANTS

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THE ONE COMPLETE LINE FOR EVERY NEED

ERIE BUCKETS

The most complete line of buckets built

We build the *complete* line of buckets for rehandling and excavating. Each bucket is sturdily built— designed for a specific class of work, and guaranteed to meet your most rigid requirements. On your next job, let ERIE give you an estimate.